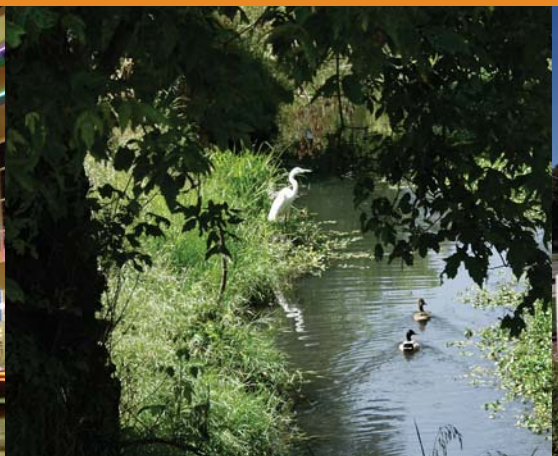
# Union City

## Climate Action Plan

**November 2010**



# Acknowledgements

## City Council

Mark Green, Mayor
Richard Valle, Vice Mayor
Carol Dutra-Vernaci, Councilmember
Manny Fernandez, Councilmember
Jim Navarro, Councilmember

## Planning Commission

Chairperson Gurnam (Gary) Singh
Vice Chair Jo Ann Lew
Commissioner Leo Guio
Commissioner Raymond Gonzales, Jr.
Commissioner Froilan (Roy) Panlilio
Alternate Philip Crosby
Alternate Angelo Artale

## City Staff

Joan Malloy, Economic and Community Development Director
Carmela Campbell, Planning Manager
Avalon Schultz, Associate Planner
Roberto Munoz, Solid Waste and Recycling Coordinator
Steve Adams, Transit Planner

## Climate Protection Task Force

Mark Green, Mayor
Manny Fernandez, City Council
Ray Gonzales, Jr., Planning Commission
Roy Panlilio, Planning Commission
Eva Kamakea, Senior Commission
Pat Gacoscos, Union Sanitary Board
Paul Bisbiglia, New Haven Unified School District
Jenny Cutter, Chamber of Commerce
Melvin Matsumoto, Chamber of Commerce
Kevin Armonio, Citizen
Christine McCoy, Citizen
Shannon Valle, Citizen
Nicholas Shutes, Citizen
Rich Currie, Union Sanitary District General Manager
David Livingston, Union Sanitary District Plant Manager
Dana Hernandez, Union City Chamber of Commerce Staff

## Consultants

### *AECOM*

Claire Bonham-Carter
Christopher Clement
Culley Thomas
George Lu
Yanna Badet
Isaac Brown
Alexander Quinn
Thia Buggia
Alastair MacGregor
Andrew Bickerdyke

### *Nelson Nygaard*

Bonnie Nelson
Michael Eiseman
Jessica ter Chure

# Mayor's Message

The potential effects of climate change could have significant impacts on the future of Union City. In response to this climate crisis, Union City has prepared a Climate Action Plan, which contains strategies to reduce greenhouse gas (GHG) emissions throughout our community.

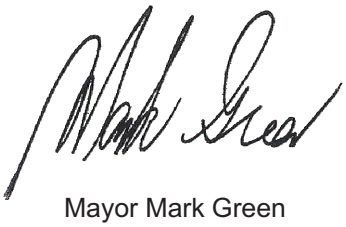
As President of the Association of Bay Area Governments (ABAG) Executive Board, I also understand the importance of Union City's role in reducing GHG emissions regionally and working in concert with the State. ABAG is a regional planning agency for the Bay Area and has been assisting with coordination efforts among cities to address this very important issue.

I want to thank the members of the Union City Climate Protection Task Force and City staff for all of their hard work throughout this process. I also want to acknowledge the public for their continued involvement and support.

Union City already has much to be proud of in the fight against climate change. These efforts include: development of the area around the BART Station into a compact, pedestrian-oriented, livable community; a strong commitment to alternative fuel use through development of southern Alameda County's largest Compressed Natural Gas (CNG) fueling station and the "greening" of the City's fleet; the adoption of a Green Building Ordinance for new construction; and the successful implementation of a 75 percent waste diversion rate by Union City's residents and businesses. We also want to build on the accomplishments of our utility providers Union Sanitary District, Alameda County Water District and Pacific Gas and Electric, who have taken effective steps to reduce water and energy consumption within the City.

We want to continue this momentum and I urge you to do your part to reduce Union City's GHG emissions community-wide. Successful implementation of this plan will take effort by everyone including City government, residents and businesses. I look forward to seeing what we can accomplish together.

Sincerely,



Mayor Mark Green

# Contents


**Acknowledgements** ..... i

**Mayor's Message** ..... ii

**Chapter 1: Introduction** ..... 1-1

- Background ..... 1-1
- Action Against Climate Change: Union City Context ..... 1-2
- Climate Change ..... 1-5
- The California and Alameda County Context ..... 1-7
- Most Commonly Used Acronyms in this Document ..... 1-10

**Chapter 2: The Planning Process** ..... 2-1

- GHG Inventories and Projections ..... 2-2
- GHG Reduction Target ..... 2-4
- GHG Reduction Action Areas ..... 2-5
- Chapter 3 Structure ..... 2-8

**Chapter 3: Greenhouse Gas Reduction Measures** ..... 3-1

- Land Use ..... 3-3
- Transportation ..... 3-9
- Buildings and Energy ..... 3-21
- Waste Reduction ..... 3-37
- Water Conservation ..... 3-45
- Green Infrastructure ..... 3-53
- Community Engagement ..... 3-59
- Climate Adaptation ..... 3-67
- Optional Measures ..... 3-73

**Chapter 4: Implementation** ..... 4-1

- Introduction ..... 4-1
- Measure Implementation ..... 4-2
- Plan Evaluation and Evolution ..... 4-5
- Estimated Staff Resources for CAP Implementation ..... 4-6
- Relationship to California Environmental Quality Act ..... 4-7
- Bay Area Air Quality Management District Guidelines ..... 4-8
- Funding Sources and Financing Mechanisms ..... 4-9

**Appendices** .....

- Appendix A: GHG Inventory ..... A-1
- Appendix B: GHG Reduction Calculations ..... B-1
- Appendix C: Economics ..... C-1
- Appendix D: Building Energy Analysis ..... D-1
- Appendix E: Public Outreach ..... E-1
- Appendix F: BAAQMD Qualification Standards ..... F-1
- Appendix G: Public Comments ..... G-1


**Greenhouse Gas Reduction Action Areas**

***Land Use***

***Transportation***

***Buildings and Energy***

***Water Conservation***

***Waste Reduction***

***Green Infrastructure***

***Community Engagement***

***Climate Adaptation***

# Chapter 1: Introduction

## Background

Climate change is one of California's most urgent environmental problems, and is considered a major global challenge for the 21st century. The impacts range from reducing snow pack in the Sierra Nevada affecting drinking water supplies to a rising sea level threatening cities along the coast and San Francisco Bay to decreasing air quality harming public health. Both at global and local level, we are starting to experience shifts in climate patterns and increased frequency of extreme weather events.

A Climate Action Plan (CAP) is a key tool that cities across the world, including many in the Bay Area and the State of California, are developing to help decrease their dependency on fossil fuel, and to decrease their share of greenhouse gas (GHG) emissions contributing to global climate change. For Union City, most GHG emissions come from energy use in buildings and gasoline burnt in cars, with water- and waste- related emissions contributing relatively smaller proportions. Union City's CAP examines each of these sectors, and sets out strategies requiring the full commitment and involvement of local residents and businesses to help the City to move towards a lower carbon future. A CAP does much more, however, than just reduce greenhouse gas emissions. Many of the strategies included within in this document will also help make Union City a more attractive place to live, through decreased traffic congestion, better air quality, cheaper energy and water bills, less waste, greener streets, more local amenities, and more local jobs.

## Action Against Climate Change – the Union City Context

Union City has been a local leader by putting in place climate-oriented policies in recent years, including those requiring political foresight and planning, such as renovation of the existing BART station, development of the Intermodal Station District and creation of a Green Building Ordinance. In May 2006, the City adopted Resolution 3167-06 authorizing the City's participation in the Alameda County Climate Protection Project and membership in ICLEI Local Governments for Sustainability. Shortly afterwards, the City commissioned ICLEI to calculate the City's 2005 GHG inventory. In addition, the City has been coordinating and working with other cities and outside agencies including, but not limited to: the Association of Bay Area Governments (ABAG), Stopwaste.Org, Pacific Gas and Electric (PG&E), Alameda County Water District (ACWD), Union Sanitary District (USD), to implement sustainable development programs.

The CAP is also fulfilling a number of the policies outlined in the Environmental Sustainability Element that was added to the 2002 General Plan in January 2008. This element addresses GHG reduction and sustainability, targeted at local government, the community, and business, as well as the transportation and building sectors.

*Union City's recent climate protection achievements include:*

- Emphasis on high-density, mixed-use transit-oriented growth through the development of the Intermodal Station District
- Development of the Largest Compressed Natural Gas (CNG) Fueling Station in Southern Alameda County
- Transitioning of Union City's Fleet into Alternative-Fuel Vehicles
- Preparation of a Short Term Transit Plan for 2008-2013
- Preparation of a Pedestrian and Bicycle Master Plan to facilitate walking and biking
- Participation in the Alameda County Safe Routes to Schools (SR2S) program
- Completion of energy audits of City facilities and plans for energy efficiency improvements with assistance from the Federal Energy Efficiency and Conservation Block Grant Program
- Adoption of a Green Building Ordinance for private and city-sponsored development
- Adoption of a Water Efficient Landscape Ordinance
- Achievement of a Waste Diversion Goal of 75 percent
- Establishment of a residential curbside composting program
- Establishment of commercial food scrap recycling program
- Support of a local farmers market
- Planting of approximately 400 trees per year

### Union City Climate Protection Vision

The Union City CAP aims to build on the achievements of the City and the community to date and achieve the City's reduction goal. The future for Union City that is envisioned in the CAP includes:

- A reduction of GHG emissions by an amount that assists State reduction targets;
- A business and residential community committed to a more sustainable way of working and living;

- An urban form that supports transit oriented development and allows neighborhood commercial districts to flourish;
- A public realm that supports bicycling and walking for everyday needs and for part of the daily commute;
- An emphasis on solar thermal and solar photovoltaic installations on homes and businesses;
- A public realm that mitigates storm events and provides shade for walking through water sensitive urban design and landscaping; and
- Water usage that sustains the local and state water supplies.

## Union City GHG Reduction Target

In 2009, Union City passed Resolution no. 3742-09, which established the City's preliminary GHG emissions goal to reduce emissions 30 percent below 2005 levels by 2020. During the development of the CAP, the City Council reevaluated that target in line with community and business feedback in the context of the current economic climate and revised the goal to a 20 percent reduction below 2005 levels by 2020. This reduction, in part, was driven by the City Council's direction to not require mandatory participation in programs that would force climate friendly actions but rather look towards a more voluntary approach. The City Council will continue to evaluate this new target and approach (and whether the 30 percent reduction target should be reestablished) as CAP progress is monitored. It should be noted that the Bay Area Air Quality Management District (BAAQMD) California Environmental Quality Act (CEQA) Guidelines recommend a GHG emissions reduction goal of 15 percent below 2005 levels by

2020 (see later section in Climate Action in California and the Bay Area), so Union City is still aiming for greater reductions than required.

## Public Outreach

The development of the CAP involved a wide range of local stakeholders from the very beginning of the process. Between December 2009 and September 2010, a Climate Protection Task Force met five times to discuss the main sectors and the potential measures appropriate to Union City. The Task Force included representatives from the City Council, Planning Commission, Union Sanitary District Board, New Haven Unified School District, Chamber of Commerce, citizen representatives and City Staff from the City Manager's Office, Planning, Public Works, and the Transit Department.

A public meeting was held in May 2010 to give the community an opportunity to provide input on the measures being proposed for the CAP prior to drafting the Draft CAP. An online survey was also available for several months as a secondary means for gathering input. An additional public meeting was held in September following the completion and posting of the Public Review Draft CAP. See Appendix E for more detail on the public outreach process.

The participation of the community is essential to help Union City achieve its GHG emission reduction goals and realize all the co-benefits already outlined. Many of the CAP strategies include continued public outreach and education. See the Community Engagement section of Chapter 3 for a summary of all the public outreach and participation being anticipated as part of the GHG reduction strategies.

### Scope and Content of the Climate Action Plan

The rest of this document outlines the CAP development process, as well as the GHG reduction measures and actions that will help the City achieve its GHG reduction target.

***Chapter 2*:** This chapter outlines the main steps that were taken to develop the CAP, including the update of the ICLEI 2005 baseline GHG inventory, projections of future emissions anticipated in 2020 in a business-as-usual scenario, and an explanation of the methodology that was used for identifying and developing the measures, including the GHG quantification and economic analysis.

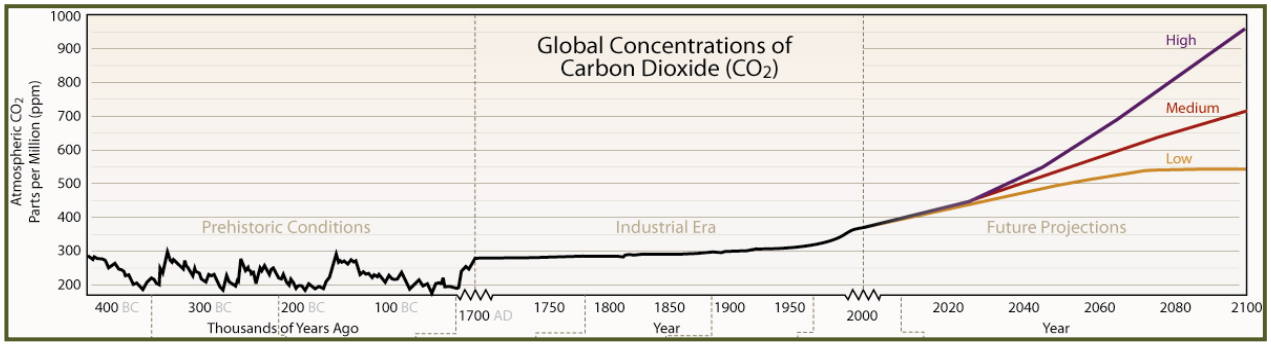
***Chapter 3:*** This chapter addresses the six main Action Areas and includes: land use, transportation, buildings and energy, water conservation, waste reduction, and green infrastructure. For each Action Area, the plan identifies the following: specific measures; actions and associated timeline; progress indicators and metrics; the key responsible parties for implementation; an estimated GHG reduction; public and private costs and private savings; and co-benefits to the community for each measure. It also includes a section on climate adaptation and some optional GHG reduction measures that the City can choose to include in the future.

***Chapter 4***: This chapter looks at measure implementation, plan evolution, and monitoring. It also describes the relationship between the CAP and relevant regulation such as the BAAQMD CEQA guidelines, and establishes criteria for staff to use when determining if a proposed development project is consistent with the CAP. Lastly, the chapter outlines potential funding strategies and financing mechanisms for City government, businesses, and residents to utilize.

***Appendices****:* Detailed appendices provide information on the following information: 2010 update to the GHG inventory; the rationale and background behind the GHG reduction quantification; the estimated costs and savings; the energy modeling undertaken for the building energy measures; public outreach related to the development of the CAP; and the BAAQMD standards qualification.

## Climate Change

The overwhelming consensus from scientists around the world is that climate change is a reality, with human activities its primary cause. Due largely to the combustion of fossil fuels, atmospheric concentrations of carbon dioxide ($CO_2$), the principal anthropogenic greenhouse gas, are at a level unequaled for at least the last 800,000 years. Greenhouse gases from human activities, such as burning of fossil fuels for use in buildings and transportation and methane production from agricultural practices, are trapping more of the sun's heat in the earth's atmosphere and warming the earth. Over the last century, average global temperatures rose by more than 1°F, and some regions warmed by as much as 4°F, with predictions for continued temperature increases in the coming years.



As shown in the graph on the previous page, trend projections indicate that atmospheric concentrations of GHG emissions will continue to increase throughout this century. If these projections become reality, climate change will threaten our economic well-being, public health, and environment.

In its 4th assessment of climate change, the United Nations International Panel on Climate Change (IPCC) provides a comprehensive overview of the impacts of climate change, as agreed upon by the largest consensus scientists ever assembled from around the world. This report describes potential global emission scenarios for the coming century. These scenarios vary from a best-case scenario characterized by low population growth, clean technologies, and low GHG emissions; to a worst-case scenario where high population and fossil-fuel dependence result in extreme levels of GHG emissions. While some degree of climate change is inevitable, most climate scientists agree that in order to avoid serious impacts from climate change, atmospheric GHG concentrations need to be stabilized as quickly as possible.

## Effects of Climate Change in Alameda County

Models of the potential impact of climate change have primarily been developed at global and regional scales and much uncertainty still exists about the extent of the changes that could be felt due to the incredibly complex interactions at play, particularly at the city level. However, potential impacts may include:

- Temperature rises of 1.8°F and 5.4°F by mid century
- Reduced water supply due to reduced snow pack and impact on summer supplies
- Increased flooding from extreme weather events and sea-level rise
- More wildfires due to increased temperatures, dry conditions, wind
- Habitat loss, species migration, endangerment, and extinction
- Longer growing season but more insect infestations
- Reduced threat from low winter temperatures, but increased irrigation demand due to progressively hot summers.

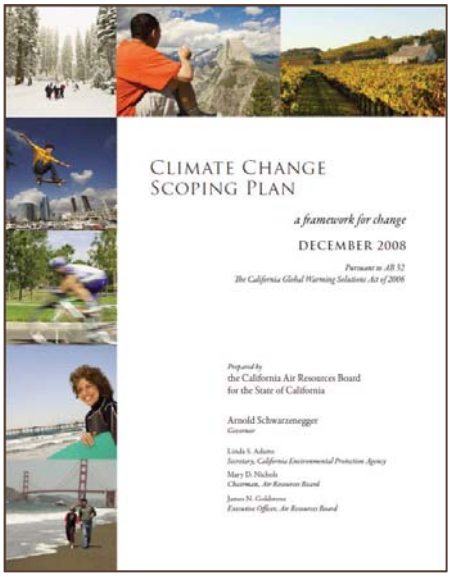
There has been some research looking specifically at effects on sea level and water supply in Alameda County.

The United States Geological Survey (USGS) has created detailed sea-level rise projections for the entire San Francisco Bay Area. These projections estimate that by 2100, approximately 200 acres within the southern Bay region of Alameda County (a large portion of which is located near Union City), could be inundated if a 4.5-foot increase in sea levels were to occur (Knowles, 2008). A study conducted by the Hayward Area Shoreline Planning Agency concluded that even though Union City is not directly adjacent to the Bay, some infrastructure elements on which the city depends are Bay-adjacent. These include wastewater pipelines and electricity transmission lines. See the Adapation section in Chapter 3 for more details on the potential impacts of sea-level rise in Union City.

The Alameda County Water District supplies Union City with water from a range of sources, including the Hetch Hetchy Reservoir, which is fed by high Sierra snowmelt. Long-term climate change is expected to reduce the snowpack runoff that provides a substantial part of this water supply.

In Chapter 3, the CAP examines the role of climate adaptation in greater depth. This chapter provides an overview of potential local impacts from climate change in more detail, and outlines potential adaptation approaches and strategies that Union City (and other cities across the Alameda County) should consider investigating in order to prepare for the impacts of climate change.

## Regional and State Actions Regarding Climate Change – the California and Alameda County Context




Union City's actions for climate protection must be set within the context of the Bay Area and the State, where much of the impetus for action stems.

### State Action

California has long been a leader in sustainability activities, as illustrated by Governor Schwarzenegger signing Executive Order (EO) S-3-05 in 2005, recognizing California's vulnerability to reduced snowpack, exacerbation of air quality problems, and potential sea-level rise due to a changing climate. To address these concerns, the Executive Order established targets to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

In 2006, California became the first State to adopt a GHG reduction target through Assembly Bill (AB) 32. This Bill requires California to reduce statewide emissions to 1990 levels by 2020. Reducing greenhouse gas emissions to 1990 levels means cutting approximately 30 percent from business-as-usual emissions levels projected for 2020, or about 15 percent from 2005 emission levels. AB 32 resulted in the production of a Scoping Plan, approved in 2008, which outlines the State's plan on how it will achieve the emissions reductions through a mixture of direct regulations, alternative compliance mechanisms, a range of different types of incentives, voluntary actions, market based mechanisms, and an AB 32 program implementation regulation to fund the program. The Scoping Plan addresses similar areas to those contained in the Union City CAP including transportation, building energy efficiency, water conservation, waste reduction, and green infrastructure.

AB 32 resulted in several pieces of companion legislation that will assist Union City in reducing its GHG emissions. For example:

**AB 1493** establishes performance standards for GHG emissions from motor vehicles.

**EO-S-1-07** establishes performance standards for the carbon intensity of transportation fuels.

**Senate Bill (SB) 107** establishes performance standards for GHG emission reductions from electric utilities.

**SB 7** sets out a water use reduction target.

**AB 811** facilitates alternative financing mechanisms for energy efficiency and renewable energy installations.

See the sections below for more details on these four policies. Up to date progress and details on all legislation and actions supporting AB 32 implementation can be found on the California Air Resource Board (ARB) website (www.arb.ca.gov).

At the time of CAP preparation, the City estimated the GHG emission reductions associated with only AB 1493, EO-S-1-07, and the Renewable Portfolio Standard (RPS) (see Chapter 2 for GHG emission reductions associated with these state programs). In the future, as the regulatory framework surrounding AB 32 grows, it may be possible to evaluate a wider range of statewide reductions.

### *AB 1493 (Pavley)*

AB 1493, California's mobile-source GHG emissions regulation for passenger vehicles, was signed into law in 2002. This bill would require the ARB to set emission standards for greenhouse gases, with no mandate for specific technology. In doing so, the ARB is to consider cost-effectiveness, technological feasibility, economic impacts, and mandate maximum flexibility to manufacturers.

### *EO-S-1-07 - The Low Carbon Fuel Standard (LCFS)*

EO-S-01-07 reduces the carbon intensity of California's transportation fuels by at least ten percent by 2020. The LCFS is a performance standard with flexible compliance mechanisms that incentivizes the development of a diverse set of clean, low-carbon transportation fuel options to reduce GHG emissions.

### *Renewable Portfolio Standard*

SB 1078, SB 107, and EO-S-14-08 have established increasingly stringent RPS requirements for California utilities. RPS-eligible energy sources include wind, solar, geothermal, biomass, and small-scale hydro.

**SB 1078** required investor-owned utilities to provide at least 20 percent of their electricity from renewable resources by 2020.

**SB 107** accelerated the timeframe to take effect in 2010.

**EO-S-14-08** increased the RPS further to 33 percent by 2020. PG&E, Union City's electricity provider, delivered 14 percent of its electricity from renewable sources in 2007.

*It should be noted that SB 1078, SB 107, and EO-S-14-08 are not quantified in this CAP because of the uncertainty of emission reductions for Union City associated with their implementation. Increasing the percentage of RPS-eligible energy sources could decrease the amount of GHG-intensive energy sources, but could also decrease the amount of GHG-free sources, which are not RPS-eligible. Therefore, no emission reductions have been credited to Union City for SB 1078, SB 107, and EO-S-14-08. The CAP uses PG&E's current emission factors and GHG-free portfolio for reduction measure quantification.*

### *SB 7*

SB 7 requires the state to achieve a 20 percent reduction in urban per capita water use by the end of 2020. The bill also requires each urban retail water supplier to develop both interim and long-term urban water use targets. Alameda County Water District is in the progress of setting a plan to help achieve these targets, and has been closely involved in the development of the CAP to see how it can help achieve this water reduction goal. SB 7 also creates a framework for future planning and actions for urban and agricultural users to reduce per capita water consumption 20 percent by 2020.

### *BAAQMD Actions*

In June 2010, BAAQMD adopted CEQA air quality thresholds of significance for use within its jurisdiction. The overall goal of this effort was to develop CEQA significance criteria that ensure that future development implements appropriate and feasible emission reduction measures to mitigate significant air quality and climate change impacts. BAAQMD's approach is to identify the emissions level for which a project would not be expected to substantially conflict with existing State legislation adopted to reduce statewide GHG emissions. If a project generates GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact and would be considered significant.

Alternatively, a local government may prepare a qualified GHG Reduction Strategy that is consistent with AB 32 goals. BAAQMD encourages such planning efforts and recognizes that careful early planning by local agencies is invaluable to achieving the state's GHG reduction goals. If a project is consistent with an adopted qualified GHG Reduction Strategy that addresses the project's GHG emissions, it can be presumed that the project will not have significant GHG emissions. This CAP is a qualified GHG Reduction Strategy. Please refer to Appendix F for discussion regarding how the CAP meets BAAQMD qualification standards.

### *AB 811*

AB 811 helps finance the upfront costs of energy efficiency improvements or renewable energy installatons that are permanent fixtures to a property. The bill authorizes cities and counties to establish assessment districts in order to provide property owners with loan financing for the installation of energy and water improvements within their home or business and pay back the amount as a line item on their property tax bill. This is achieved through the creation of a financing mechanism called a Property Assessed Clean Energy (PACE) finance program. More details can be found in Chapter 4.

### Alameda County Action

Alameda County has a long history of promoting environmental sustainability and adopting actions to reduce greenhouse gas emissions. Since 2006, the County has been leading an ongoing, coordinated effort to reduce the GHG emissions within all its 14 cities called the Alameda County Climate Protection Project. Participant cities, including Union City, work together to focus on key action areas, such as energy efficiency, transportation, and waste reduction, and on projects best addressed by a regional effort, such as collaborative grant applications. Most recently, Union City has participated in County-wide projects led by Stopwaste.Org relating to Energy Upgrade California which relate to funding and alternative financing. In May 2010, the Alameda County Board of Supervisors adopted 16 Commitments to Climate Protection that provide an overarching vision, a goal of 15 percent GHG reductions by 2020, and the Alameda County Climate Action Plan for Government Services and Operations, which includes 80 recommended actions that will enable the County to reach the reduction target. The County is currently in the process of developing a CAP for the unincorporated areas of the County. All of the other 13 cities that are part of Alameda County are in the process of developing, adopting or have adopted a CAP.

## Most Common Acronyms Used in this Document

| | |
|---|---|
| AB | Assembly Bill |
| ABAG | Association of Bay Area Governments |
| ACWD | Alameda County Water District |
| ARB | California Air Resources Board |
| BAAQMD | Bay Area Air Quality Management District |
| CAP | Climate Action Plan |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| $CH_4$ | Methane |
| CNG | Compressed Natural Gas |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide equivalent |
| DOE | US Department of Energy |
| ECD | Union City Economic and Community Development |
| EPA | U.S. Environmental Protection Agency |
| EO | Executive Order |
| GBC | California Green Building Code (CalGreen) |
| GHG | Greenhouse Gas |
| GWP | Global Warming Potential |
| HVAC | Heating, ventilating, and air conditioning |
| ICLEI | International Council of Local Environmental Initiatives, renamed to "ICLEI – Local Governments for Sustainability" |
| IPCC | Intergovernmental Panel on Climate Change |
| LCFS | Low Carbon Fuel Standard |
| LEED | Leadership in Energy and Environmental Design |
| LID | Low Impact Development |
| MT | Metric Tons |
| MTC | Metropolitan Transportation Commission |
| PACE | Property Assessed Clean Energy |
| PG&E | Pacific Gas and Electric |
| RPS | Renewable Portfolio Standard |
| SB | Senate Bill |
| TDM | Transportation Demand Management |
| USD | Union Sanitary District |
| USGBC | U.S. Green Building Council |
| USGS | United States Geological Survey |
| VMT | Vehicles Miles Traveled |

# Chapter 2: The Planning Process

The City of Union City has developed long-term strategies to mitigate its contribution to climate change through preparation of this Climate Action Plan. By reducing GHG emissions generated from community-wide activities, the City is positioning itself to better withstand the impacts of climate change (discussed in Chapter 1). The City's development of a CAP to reduce GHG emissions parallels climate change planning processes being followed by more than 50 other California jurisdictions, and will contribute to preparing the city, region, and state for the eventual impacts of climate change. This process includes:

- Completion of a baseline GHG emissions inventory and projecting future emissions;
- Identification of a community-wide GHG reduction target;
- Preparation of a GHG reduction plan to identify strategies and measures to meet the reduction target;
- Identification and development of GHG reduction measures and actions and evaluation of their environmental impacts consistent with the California Environmental Quality Act; and
- Monitoring the effectiveness of reduction measures and adapting the plan to changing conditions.

## Greenhouse Gas Emission Inventories and Projections

### Baseline Emissions Inventory

The purpose of a GHG emissions inventory is to gather information about sources of emissions in order to assist policy makers in effectively implementing cost-effective GHG-reduction policies, actions, and control measures in policy areas over which they have operational and discretionary control. An accurate inventory is necessary to understand which sectors comprise the largest portion of the GHG inventory, have the most reduction potential, and can be effectively influenced by policies and actions implemented by the City. In 2006, the International Council of Local Environmental Initiatives (ICLEI), in collaboration with the City, developed a baseline GHG emissions inventory for 2005. The inventory was compiled using ICLEI's Clean Air Climate Protection (CACP) software and input data from a variety of information sources.

The City's baseline inventory is organized by emission sectors. A "sector" is a distinct subset of a market, society, industry, or economy, whose components share similar characteristics. An emission sector may also contain subsectors that provide more specificity about the source of emissions (e.g., natural gas or electricity can be a subsector of energy consumption). With respect to GHG inventories, sectors can be thought of as public or private. The CACP software divides an inventory into basic emission sectors, including residential, commercial, and industrial energy use; transportation; and solid waste. The City has added the water consumption sector into its baseline 2005 inventory.

For the purposes of this CAP, the municipal and community-wide inventories are shown separately. However, it should be noted that the municipal inventory is included as a subset of the community-wide inventory.

In 2010, the baseline 2005 inventory was further refined to more accurately represent commercial and industrial energy consumption, on-road motor vehicles, solid waste, and water consumption activities directly attributable and influenced by the City. This inventory will be used to establish an emissions baseline for the CAP. The major emission sectors included are residential, commercial, and industrial energy consumption; transportation; solid waste disposal; and water consumption. The baseline inventory, separated out by each major emission sector, is shown below in Table 2-1. See Appendix A for more details on the development of the inventory.

### Business-as-Usual Projections

The baseline inventory was used to project the City's GHG emissions in 2020 under a business-as-usual scenario. The GHG reduction measures developed for the City's CAP would be applied to the 2020 emissions levels to determine if the City will achieve its GHG reduction goal. The business-as-usual scenario assumes that historical and current GHG-generating practices and trends for energy consumption, transportation, solid waste, and water consumption will continue until 2020. The 2020 business-as-usual projections do not include GHG reductions associated with the statewide GHG reduction programs or CAP measures.

The 2020 business-as-usual projections were performed using applicable and appropriate indicators for each sector. Refer to Appendix A for detailed descriptions of business-as-usual projections. A 2020 target

year was used to be consistent with the AB 32 target year. It should be noted these projections have been developed for planning purposes, and due to the complexity of each emissions sector, are subject to change. As 2020 approaches, the City will reevaluate its future GHG reduction targets to incorporate progress toward long-term GHG reductions goals. Union City's 2020 business-as-usual projected emissions are also presented in Table 2-1.

### Table 2-1: Union City 2005 GHG Inventory and Projected 2020 Emissions

| Union City GHG Inventory: 2005 & 2020 (Projected) | | | | | | |
|---|---|---|---|---|---|---|
| **Sector** | **2005** | | **2020** | | **Change** | |
| | **MT $CO_2e$/yr** | **% of Total** | **MT $CO_2e$/yr** | **% of Total** | **MT $CO_2e$/yr** | **% Change** |
| **Buildings** | **183,689** | **53.6%** | **193,823** | **53.2%** | **10,129** | **5.5%** |
| *Residential* | *70,239* | *20.5%* | *79,517* | *21.8%* | *9,277* | *13.2%* |
| *Commercial & Industrial* | *113,454* | *33.1%* | *114,306* | *31.4%* | *852* | *0.8%* |
| **Transportation** | **126,984** | **37.1%** | **130,831** | **35.9%** | **3,847** | **3.0%** |
| *City Wide VMT* | *101,112* | *29.5%* | *104,176* | *28.6%* | *3,063* | *3.0%* |
| *State Highway VMT* | *25,872* | *7.6%* | *26,656* | *7.3%* | *784* | *3.0%* |
| **Waste** | **25,324** | **7.4%** | **31,873** | **8.8%** | **6,549** | **25.9%** |
| **Water** | **6,296** | **1.8%** | **7,716** | **2.1%** | **1,420** | **22.6%** |
| **Total** | **342,297** | **100.0%** | **364,243** | **100.0%** | **21,946** | **6.4%** |

*Note: figures may not add exactly due to rounding.*

## Greenhouse Gas Emission Sources

Assuming that the current emissions-generating practices continue to occur within the City, community-wide GHG emissions are anticipated to increase by approximately six percent in 2020 over 2005 levels. GHG emissions and consumption activities associated with energy (i.e., electricity and natural gas), transportation, solid waste, and water consumption are all anticipated to increase in the city from 2005 to 2020. Solid waste, water, and residential energy consumption are anticipated to have the greatest increase during this period, with GHG emissions rising by approximately 26 percent, 23 percent, and 13 percent from 2005 to 2020, respectively. A description of the methods and sources of information used to complete the City's 2005 GHG emissions inventory and 2020 projections is provided in Appendix A. All GHG emissions have been calculated and presented in metric tons of carbon dioxide equivalent emissions per year (MT $CO_2e$/yr). Union City's 2005 and 2020 emissions from each emission sector are presented in Table 2-1.

## GHG Reduction Target

Adopting an emission reduction target is an important step in assessing the effectiveness of the CAP. In comparison to many other California jurisdictions, Union City is nearly built out except for the areas within the City's Intermodal Station District, which limits the types of measures that can be successfully implemented. However, approximately 40 percent of Union City's residential units and many of its commercial buildings were built prior to implementation of California's Title 24 Energy Efficiency Standards, which provides an opportunity for GHG reductions in the building energy sector. Understanding this context, the City's baseline inventory and business as usual projections as well as the many other factors unique to Union City, the region and state led to establishment of a reduction target. The City Council of Union City recommended a community-wide reduction target of 20 percent below 2005 baseline emission levels by 2020 (see Chapter 1 for more details on the GHG reduction target). This target corresponds to a 2020 GHG emissions level 273,838 MT $CO_2e$/yr, which is an absolute reduction of 90,405 MT $CO_2e$/yr in 2020. Figure 2-1 demonstrates the magnitude of the GHG reduction target.

*Figure 2-1: GHG Reduction Target – 20 percent below 2005 levels by 2020*

## GHG Reduction Action Areas

Building on the City's tradition of environmental leadership, the CAP sets out a route map to reduce community-wide GHG emissions. Implementing reduction strategies in the six main Action Areas presented in this chapter can assist the City in achieving its initial reduction target of 20 percent below 2005 emission levels by 2020. The strategies identified affect issues within the City's direct influence. Each Action Area is subdivided into a series of GHG reduction measures.

Measures were developed by (a) evaluating existing community conditions, (b) identifying emission reduction opportunities within the City, including those identified by the Climate Task Force, (c) reviewing best practices from other jurisdictions and organizations, and (d) incorporating State and regional laws, guidelines, and recommendations. After considering a wide range of potential options, measures and actions were recommended based on the following criteria

- Is it technically feasible to implement the measure?
- Does the measure create additional community benefits (e.g., quality of life, public health) and would the community support it?
- What are the potential costs and savings of measure implementation?

The six GHG reduction Action Areas are organized as follows:

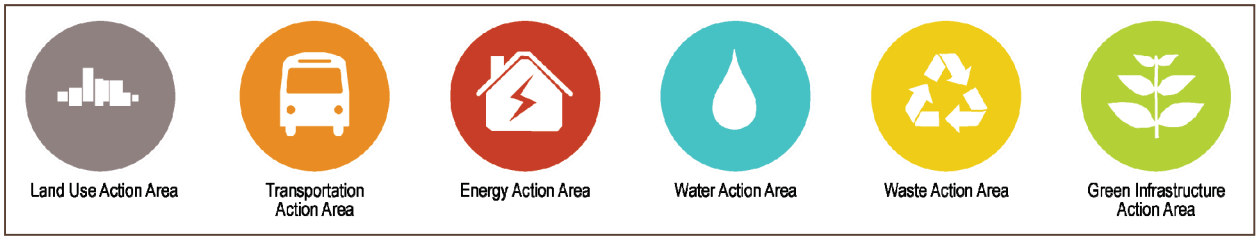



*Figure 2-2: Action Areas*

Measures and actions are recommended in each sector that translates the vision of the CAP into on-the-ground action. *Measures* define the direction that the City will take to accomplish GHG reduction goals. *Actions* define the specific steps that the City will take over time.

### GHG Reduction Potential

By 2020, GHG emission reductions generated through implementing the six Action Areas have the potential to reduce GHG emissions by 46,380 MT $CO_2e$/yr in 2020. GHG emission reductions attributed to State legislation have the potential to reduce GHG emissions by another 53,680 MT $CO_2e$/yr. Together, statewide legislation and GHG reduction strategies have the potential to reduce GHG emissions in Union City by approximately 100,060 MT $CO_2e$/yr, which is approximately 22.8 percent below 2005 emission levels as measured from business-as-usual conditions in 2020. Thus, the recommended CAP measures exceed the City's GHG reduction target of 20 percent below 2005 emission levels by 2020. This margin of error accounts for the inevitable uncertainty factor in developing long-term projections of emission levels and the GHG reduction potential of CAP measures. It should also be noted that there are a number of supporting measures included in the CAP, which will result in additional GHG reductions. The reductions from these measures can be counted in the CAP to the extent that they can be quantified in the future.

Table 2-2 summarizes the GHG reduction potential of the CAP measures and State legislation. Figure 3-2 summarizes the GHG reduction potential of the CAP and each constituent Action Area.

## Statewide Greenhouse Gas Reductions

Statewide reductions from implementation of AB 1493, LCFS, and the RPS (see Chapter 1 for descriptions of each policy) were also considered during the development of the GHG emission reduction measures, and assessment of the overall target. Counting only these three statewide initiatives towards the GHG reduction target is considered a conservative approach.

The ARB estimates that implementation of GHG emission reduction standards for new passenger cars, pickup trucks, and sport utility vehicles, as described in AB 1493, will achieve a 15.76 percent increase in vehicle performance and therefore reduce the overall GHG emissions from on-road mobile sources by 2020 (ARB Scoping Plan). This increase in statewide vehicle efficiency standards was considered in evaluating achievement of the GHG reduction target. These standards can effectively reduce GHG emissions in the transportation sector by 20,620 MT $CO_2$e/yr.

The City recognizes that statewide reductions will also occur from implementation of LCFS. Based on current available data, LCFS standards are projected to reduce overall statewide GHG emissions attributable to vehicle fuels by approximately 10 percent. This increase in statewide vehicle-fuel efficiency can effectively reduce GHG emissions in the transportation sector by 11,020 MT $CO_2$e/yr.

PG&E emission factors incorporate the mandated requirements of RPS, which require 33 percent of PG&E's electricity production to be from renewable sources. The current percentage of PG&E portfolio that is accounted for through renewable energy generation is 14 percent. In accounting for the 19 percent of additional renewable energy capacity that will be developed by 2020, the additional emissions reductions attributed to the RPS are estimated to be 22,040 MT $CO_2$e/yr.

The City's actions, together with the effects of AB 1493, LCFS, and the RPS in Union City, generate a combined reduction of 100,060 MT $CO_2$e/yr, or approximately 22.8 percent below 2005 levels. While statewide reductions result in a significant contribution toward achieving the City's target, the extent of their implementation and magnitude of the impacts on GHG emissions is limited and additional action by the community and City government is required to reach the reduction goal. The recommended CAP measures outline a path to achieving the GHG reduction target in conjunction with statewide reductions.

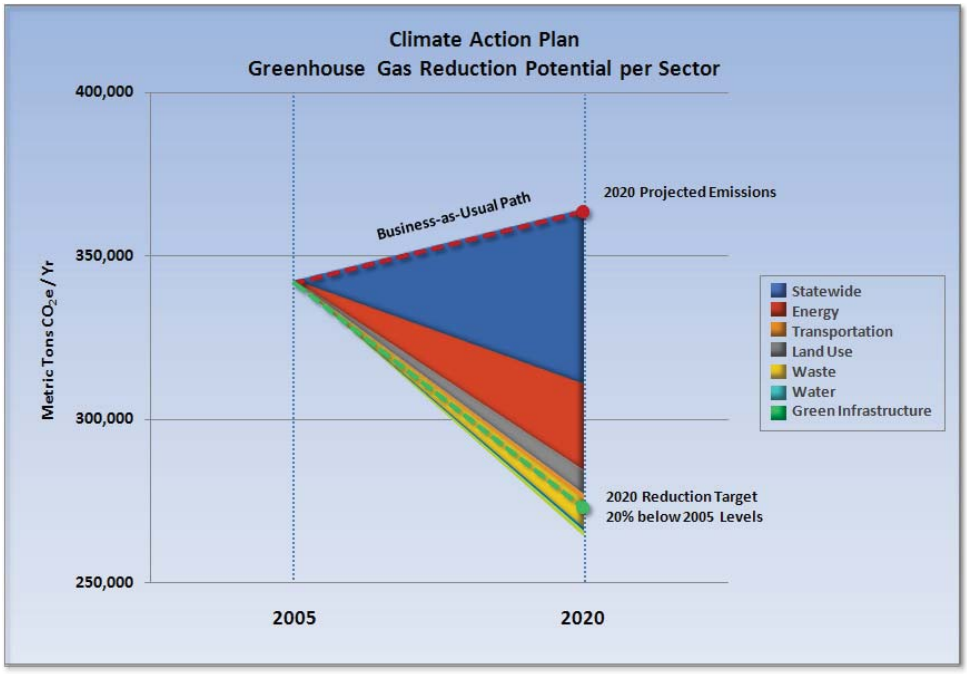



*Figure 2-3: GHG Reduction Potential of the CAP subdivided into Action Areas*

Table 2.2 below summarizes the GHG reductions achieved in each Action Area, and Figure 2-3 shows the distribution of GHG reductions achieved by the CAP. Appendix B contains a detailed description of GHG quantification methodology used for each quantified measure in the CAP.

## Table 2-2: GHG Reduction Measures and Associated Reductions

| | |
|---|---|
| LAND USE ACTION AREA | 7,070 MT $CO_2e$/yr |
| TRANSPORTATION ACTION AREA | 1,590 MT $CO_2e$/yr |
| BUILDINGS AND ENERGY ACTION AREA | 26,320 MT $CO_2e$/yr |
| WATER CONSERVATION ACTION AREA | 880 MT $CO_2e$/yr |
| WASTE REDUCTION ACTION AREA | 8,920 MT $CO_2e$/yr |
| GREEN INFRASTRUCTURE ACTION AREA | 1,600 MT $CO_2e$/yr |
| STATE LEVEL REDUCTIONS | 53,680 MT $CO_2e$/yr |
| **TOTAL GHG REDUCTIONS** | **100,060 MT $CO_2e$/yr** |
| | **22.8% below 2005 levels in 2020** |

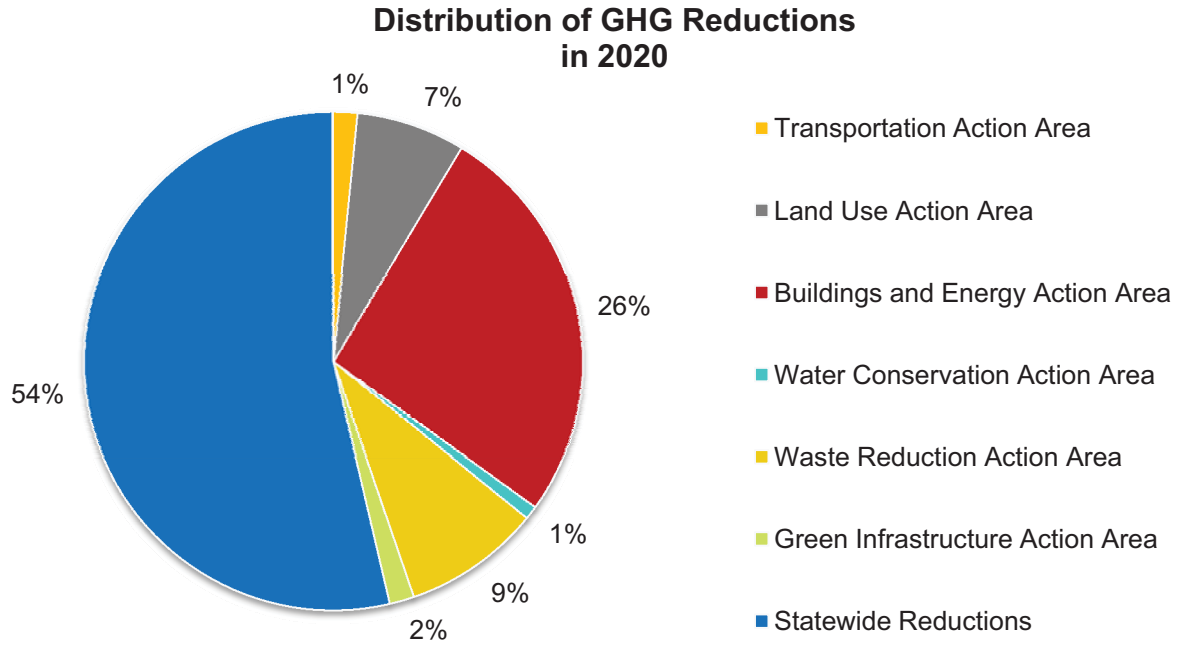



*Figure 2-4: Distribution of GHG Reductions in 2020 achieved by the CAP*

## Chapter 3: Greenhouse Gas Reduction Measures Structure

Chapter 3: GHG Reduction Measures is organized by Action Area (e.g., land use; transportation; buildings and energy; water conservation; waste reduction; and green infrastructure). These six action areas represent the primary ways to reduce community-wide GHG emissions in Union City. Each section begins with an introduction, including the GHG emission inventory and potential reductions. This introduction is followed by the measures and actions that translate the City's GHG reduction target to an on-the-ground implementation strategy.

### GHG Reduction Measures

Measures define the programs, policies, and projects that the City will undertake to accomplish its GHG emission reduction target. The following paragraphs describe the format and content of the measures.

#### *Measure Description*

The description of measures provides important background information describing the City's rationale and policy direction. Additionally, some descriptions provide detailed guidance that will be used in program implementation.

#### *Action Step and Progress Indicator Tables*

Detailed action steps and progress indicators are provided in a table following each measure description. Actions identify specific steps that the City will take to implement each measure. These tables also identify responsible departments and establish an implementation schedule for each action. Actions are classified into short-, medium-, and long-term, which are defined as follows: short-term is between zero and two years; medium term is between two and five years; and long-term is greater than five years. Progress indicators and performance targets provided in the table enable staff, the City Council, and the public to track implementation and monitor overall CAP progress.

#### *Greenhouse Gas Reduction Potential*

Values within the GHG Reduction Potential column of the measure summary identify the estimated annual emission reductions anticipated in 2020 in MT $CO_2e$/yr. Many measures generate directly quantifiable GHG reductions. However, not all measures have a quantifiable GHG reduction potential. Non-quantified measures are included in the CAP as supporting measures that facilitate the reduction potential of related quantified measures, or that complement the overall suite of measures and actions proposed in the CAP.

Non-quantified measures do not have a GHG reduction potential could not be estimated at the time of plan preparation for one of the following reasons: (a) insufficient data exists to quantify GHG reduction potential, (b) no reliable quantification methodology currently exists to calculate these reductions, or (c) the GHG emission reductions attributable to the measure do not directly reference any component of the baseline GHG inventory, and thus cannot be counted towards the City's 2020 emissions reduction target. Supporting measures remain within the CAP because these actions do reduce global emissions and have important community benefits. Additional information pertaining to the GHG reduction calculations is provided in Appendix B.

## Community Co-benefits

Beyond reducing emissions, many recommended CAP measures have the potential to provide other important benefits to the community. These benefits represent an improvement in the quality of life in Union City and protect the earth's climate. They are identified using the following icons:

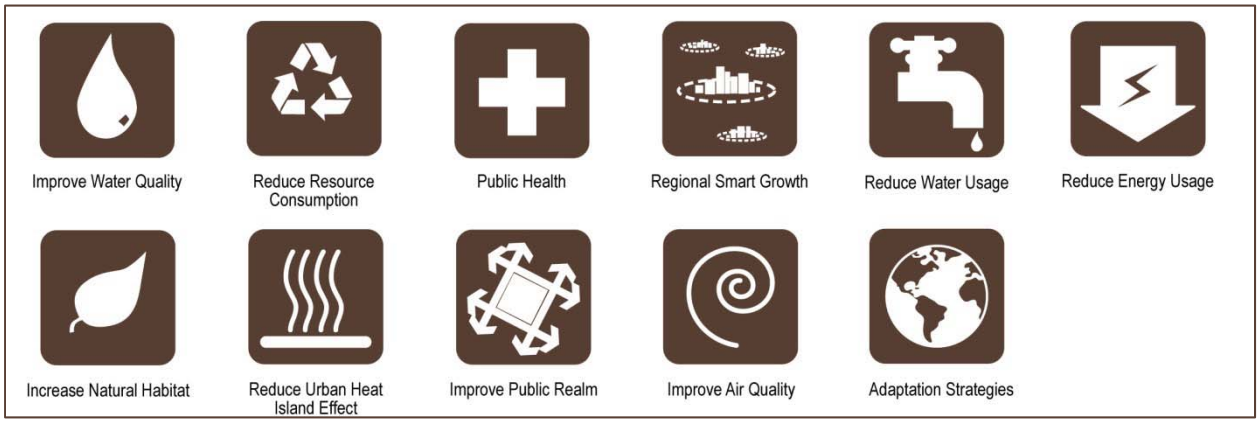



*Figure 2-5: Community Co-benefits*

## Costs and Savings

For each measure, potential costs to the City, as well as costs and savings to private residents and businesses are categorized as very low, low, medium, and high. The economics analysis covers all actions associated with the measure, though there is less accuracy in gauging the costs and savings associated with long-term actions. Table 2-3 on the next page summarizes these category definitions. Supporting information on economic analysis is provided in Appendix C. Additional information on the building energy economic analysis is provided in Appendix D.

## Funding and Financing

Though the City will bear some financial burden to implement measures in the CAP, a wide range of funding sources and financing strategies can be leveraged to offset costs to the City and local residents and businesses.

Chapter 4 and Appendix C provide a discussion of applicable funding sources and financing programs. Most, if not all, of the sources described require additional effort to access. Although information in the CAP is current as of 2010, the array of funding and financing options is ever-evolving. Additional opportunities for funding or financing CAP measures will likely emerge as the City implements the CAP.

### Table 2-3: Measure Cost Type, Category, and Ranges

| Type | Costs and Savings Range |
|---|---|
| **Cost to City** | *Very Low*: Below $10,000<br>*Low*: $10,001 - $20,000<br>*Medium*: $20,001 - $100,000<br>*High*: Greater than $100,000 |
| **Cost to Resident or Business** | *Very Low*: Below $100<br>*Low*: $101 - $200<br>*Medium*: $201 - $1,000<br>*High*: Greater than $1,000 |
| **Savings to Resident or Business** | *Very Low*: Below $25/year<br>*Low*: $26/year - $50/year<br>*Medium*: $51/year - $250/year<br>*High*: Greater than $250/year |

*Note: Additional building energy economic analysis was performed to model the energy savings, costs, savings, and simple payback associated with different packages of energy conservation measures. Information on this analysis is contained in Appendix D and referenced in Appendix C.*

# Chapter 3: Greenhouse Gas Reduction Measures

This chapter describes measures and actions necessary to reduce GHG emissions in the City, and achieve the reduction target of 20 percent below 2005 levels by 2020. Each measure is designed to either achieve GHG reductions or support other measures that do have a quantifiable GHG reduction potential. To ensure proper implementation, each measure is accompanied by a description giving background and policy details, an implementation plan that articulates the necessary actions, City departments and government agencies with primary responsibility, as well as progress indicators and associated timelines. The effectiveness of measures and actions will be evaluated biannually and modified as necessary to achieve the City's reduction target by 2020.

In addition to the six Action Areas described in Chapter 2, there are two additional sections in this chapter that address public outreach and adaptation. Community Engagement consolidates the public outreach components of the GHG reduction measures and the Adaptation section provides an overview of climate adaptation and introduces potential adaptation strategies for Union City to consider.

The GHG reduction measures in this CAP, together with the impacts of state-level legislation in Union City, generate a combined reduction of 100,060 MT $CO_2e$/yr, or approximately 22.8 percent below 2005 levels (see Table 3-1 for a full list of the quantified measures and their associated GHG reductions).

## Table 3-1: Summary of GHG Reduction Measures and Associated Reductions*

| | | |
|---|---|---|
| **LAND USE ACTION AREA** | | **7,070 MT $CO_2e$/yr** |
| **LU-1.1** | Continue supporting transit-oriented development in the Intermodal Station District and adjacent areas. | 6,810 MT $CO_2e$/yr |
| **LU-2.1** | Enhance existing neighborhood-serving commercial centers in the city. | 260 MT $CO_2e$/yr |
| **TRANSPORTATION ACTION AREA** | | **1,590 MT $CO_2e$/yr** |
| **T-1.1** | Continue build-out (goal of 25% build-out), to the extent feasible, of the Pedestrian and Bicycle Master Plan by 2020. | 700 MT $CO_2e$/yr |
| **T-2.1** | Provide transit priority and express routes on the Alvarado-Niles and Whipple corridors. | 80 MT $CO_2e$/yr |
| **T-2.2** | Convert bus fleet to compressed natural gas or hybrid vehicles. | 270 MT $CO_2e$/yr |
| **T-3.1** | Increase participation employers in transportation demand management programs. | 540 MT $CO_2e$/yr |
| **BUILDINGS AND ENERGY ACTION AREA** | | **26,320 MT $CO_2e$/yr** |
| **E-1.1** | Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to homeowners. | 2,120 MT $CO_2e$/yr |
| **E-2.1** | Work with PG&E to promote existing household appliance upgrades. | 2,200 MT $CO_2e$/yr |
| **E-3.1** | Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | 1,450 MT $CO_2e$/yr |
| **E-3.2** | Promote 'Cool Roofs'. | 4,510 MT $CO_2e$/yr |
| **E-4.1** | Continue implementing the Green Building Ordinance. | 1,860 MT $CO_2e$/yr |
| **E-5.1** | Work to accelerate Smart Grid integration in existing and new buildings. | 3,550 MT $CO_2e$/yr |
| **E-6.1** | Develop program to facilitate the installation of solar hot water heaters in homes. | 4,170 MT $CO_2e$/yr |
| **E-7.1** | Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to homeowners. | 2,990 MT $CO_2e$/yr |
| **E-7.2** | Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | 2,910 MT $CO_2e$/yr |
| **E-8.1** | Explore opportunities to reduce energy consumption of wastewater facility through methane-to-energy production, as well as solar PV installation. | 560 MT $CO_2e$/yr |
| **WASTE REDUCTION ACTION AREA** | | **8,920 MT $CO_2e$/yr** |
| **WR-1.1** | Increase Waste Diversion Target to 90 percent. | 8,920 MT $CO_2e$/yr |
| **WATER CONSERVATION ACTION AREA** | | **880 MT $CO_2e$/yr** |
| **WC-1.1** | Water Efficient Landscape Ordinance. | 290 MT $CO_2e$/yr |
| **WC-1.2** | Indoor and Outdoor Non-potable Water Systems Program. | 240 MT $CO_2e$/yr |
| **WC-2.1** | Work with Alameda County Water District to expand outreach programs and incentivize water conservation throughout Union City. | 350 MT $CO_2e$/yr |
| **GREEN INFRASTRUCTURE ACTION AREA** | | **1,600 MT $CO_2e$/yr** |
| **GI-1.1** | Expand the urban forest to sequester carbon and reduce building energy consumption. | 1,600 MT $CO_2e$/yr |
| **STATE LEVEL REDUCTIONS** | | **53,680 MT $CO_2e$/yr** |
| **TOTAL GHG REDUCTIONS** | | **100,060 MT $CO_2e$/yr (22.8% below 2005 levels in 2020)** |

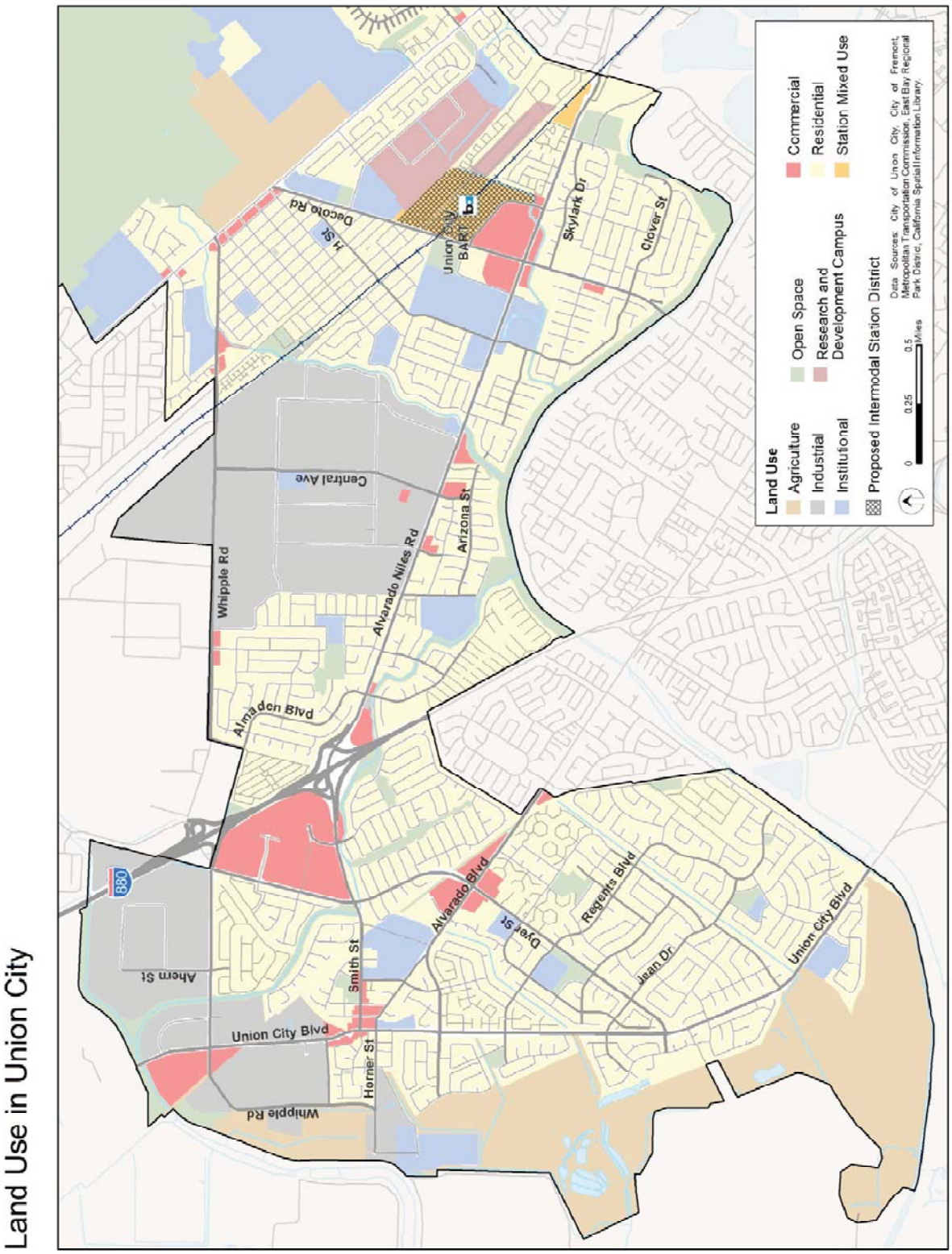
** Does not include supporting measures*

# Land Use

Land use patterns have a strong influence on the amount of transportation-related GHG emissions generated within Union City (approximately 114,300 MT $CO_2$e/yr in 2020). The density of development, mix of uses, proximity to transit, street design, and other factors influence how far residents and employees travel to meet daily needs and to work, and whether they choose to walk, bike, use public transit, or drive. The majority of Union City was developed in a land use pattern (see Map LU) that emphasizes low-density residential neighborhoods and strip-commercial centers. Because residential neighborhoods, shops, services, and employment centers are often separated from each other by considerable distances, this land use pattern generates high levels of automobile use and emissions.

The measures contained in this section seek to reduce GHG emissions in existing neighborhoods and reiterate the City's commitment to locate the majority of future development in a high-quality pedestrian- and transit-oriented environment. Existing commercial centers retrofits and mixed-used infill development will increase residents' access to goods and services and reduce the need for automobile trips. The City's Intermodal Station District and adjacent areas offer considerable opportunity to reduce emissions associated with future development. Locating a mix of residential, commercial, and employment uses within close proximity to BART, bus, and rail transit services will ensure that Union City can accommodate its share of regional growth in a climate-friendly manner. Additional community co-benefits of this type of smart growth include a reduction in congestion and improvements in air quality.

The total GHG emission reduction potential of the Land Use Action Area is estimated to be 7,070 MT $CO_2$e/yr in 2020, or approximately seven percent of the total reductions achieved by the CAP.




**Map LU:** Land Use in Union City

# LU-1: Transit-Oriented Development

## Measure LU-1.1: Continue supporting transit-oriented development in the Intermodal Station District and adjacent areas.

Transit-oriented development (TOD) refers to the creation of compact, walkable communities centered around high-quality light rail, train, or bus transit systems. Union City's Intermodal Station District offers the potential to become a world-class TOD project.

Full implementation of the vision for the Intermodal Station District will result in the area around the Union City BART Station transformed into a transit-oriented community with new retail, job centers, housing, and public amenities. When complete, the Intermodal Station District will feature approximately 1.2 million square feet of office space, 120,000 square feet of retail space, and 1,784 new housing units (of which over 654 have already been built). In addition to existing bus and BART connections, new rail connections are planned that include the Capitol Corridor line that will provide service to San Jose and Sacramento; Dumbarton Rail, with service across the Bay to Menlo Park, Redwood City and connections to San Francisco and San Jose; and the Altamont Commuter Rail with service to San Jose and Stockton.

Locating the majority of the City's new growth within the Intermodal Station District and adjacent areas will considerably reduce the community's and region's GHG emissions in 2020 and beyond. Research by the San Francisco Bay Area Metropolitan Transportation Commission (MTC) in 2006 indicates that persons in households living less than ½ mile from major transit stations drive approximately half as much as those living further away.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Ensure that the build-out of the Intermodal Station District meets or exceeds the planned residential, commercial, and employment densities. | ECD |
| **B** | Create infrastructure investment program that identifies and implements basic infrastructure improvements needed to attract TOD developers. | ECD |
| **C** | Continue with paid parking program within the Intermodal Station District. | ECD |

| *Progress Indicators* | *Target* |
|---|---|
| Number of residential units developed within the Intermodal Station District, or within ½ mile of the District. | 1,784* by 2020 |
| Number of jobs to be located within the Intermodal Station District, or within ½ mile of the District. | 3,000* by 2020 |

** Progress indicators based on full build-out of General Plan and 2009 ABAG projections for housing and employment for 2020.*

**GHG Reduction Potential**

6,810 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

High

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Low

**GHG Reduction Potential**

260 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Low

# LU-2: Neighborhood Commercial Centers

## Measure LU-2.1: Enhance existing neighborhood-serving commercial centers in the city to increase residents' access to daily goods and services and encourage the development of mixed-use centers along the City's major corridors, where appropriate.

The majority of Union City's shops and services are located in commercial strips along major arterial streets. These commercial areas tend to be heavily automobile-oriented and contain only commercial land uses. During the CAP development process, numerous residents, business owners, and developers identified an opportunity to retrofit some existing commercial areas into pedestrian-oriented mixed-use neighborhood-serving centers and to encourage additional mixed-use centers (i.e. ground-floor commercial with residential above).

To facilitate this transition, the City will conduct a visioning process to identify the community's goals for commercial center retrofits and new mixed-use centers, and to recommend sites with the highest potential. Design guidelines should also be prepared to translate the community's vision into reality. The City will work with interested property owners and developers to facilitate the transformation of the selected sites.

Research demonstrates that average daily shopping and errand trips in well-serviced neighborhoods are less than half the distance than in neighborhoods with low levels of diversity. This research also indicates that residents who live within a ¼ mile of vibrant neighborhood centers are more likely to walk or bike in order to purchase daily goods and services. Enhancing the quality and diversity of uses in the City's neighborhood commercial centers will help decrease transportation-related GHG emissions and improve residents' quality of life.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Conduct a community visioning process to identify the goals for commercial center retrofits and new mixed-use centers, and recommend sites with the highest potential. | ECD |
| **MEDIUM-TERM** | | |
| **B** | Develop commercial center retrofit and mixed-use development design guidelines. | ECD |

| *Progress Indicators* | *Target* |
|---|---|
| Number of commercial areas converted to pedestrian-oriented mixed-use neighborhood-serving centers. | three by 2020 |
| Number of residential units developed within pedestrian-oriented, mixed-use neighborhood-serving centers. | 230 by 2020 |

# LU-3: Land Use Policies

## Measure LU-3.1: Ensure that City policies, development standards, regulations, and design guidelines facilitate high quality mixed-use pedestrian-oriented and transit-friendly land use patterns and development.

Union City wants to encourage the construction of high quality mixed-use pedestrian- oriented and/or transit-friendly projects. To facilitate this, the City will conduct a comprehensive evaluation of the City's zoning ordinances, subdivision regulations, street standards, development standards, and design guidelines to identify policies that act as regulatory barriers to desired forms of climate-friendly, compact development (e.g., TOD, mixed-use, higher density). While ensuring the protection of public health, safety, and welfare, the City will revise standards that act as unnecessary regulatory barriers.

The City will also consider establishing minimum performance standards (e.g., minimum densities and floor-area ratios) in order to prevent underutilization of key growth areas. The City will evaluate the potential of lowering parking standards and requiring unbundled parking in higher density residential products where parking spaces are rented separately from occupied building space. The City will also seek to explore the feasibility of additional incentives for smart growth development such as appropriate density bonuses.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Conduct a comprehensive evaluation of the City's regulations, standards, and design guidelines to identify and remove and unnecessary regulatory barriers. | ECD |
| **B** | Evaluate the potential of minimum performance standards in order to prevent underutilization of key growth areas. | ECD |
| **C** | Evaluate the potential of an unbundled parking requirement for higher density residential products and/or reducing parking requirements. | ECD |
| **MEDIUM-TERM** | | |
| **D** | Determine feasibility of additional incentives for smart growth development. | ECD |

| *Progress Indicators* | *Target* |
|---|---|
| N/A | N/A |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

*This page was left blank intentionally*

# Transportation

The transportation of goods and people generates approximately one-third of Union City's GHG emissions (114,306 MT $CO_2e$/yr in 2020). State-mandated technological changes in fuel efficiency and reductions in the carbon content of vehicle fuels will help reduce these emissions considerably, but in order to reach the City's GHG reduction target, additional local action will be necessary.

Within Union City, the majority of commute (73 percent), shopping, and recreational trips are done in private automobiles. The City aims to increase resident and employee use of alternative travel modes such as public transit, carpooling, bicycling, and walking by investing in transit service and infrastructure improvements within the community. Only 6.3 percent of commuting trips were by public transit in 2006.

While investments in alternative travel modes will play an important role in reducing transportation-related GHG emissions, they will also help relieve roadway congestion, reduce air pollution, and improve personal safety and fitness. These improvements could also improve the community's resilience to potential increases in transportation fuel costs.

The total GHG emission reduction potential of the Transportation Action Area is estimated to be 1,590 MT $CO_2e$/yr in 2020 or approximately one percent of the total reductions achieved by the CAP.

**GHG Reduction Potential**

700 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

High

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Very Low

# T-1: Walking and Bicycling

## Measure T-1.1: Continue build-out (goal of 25 percent build-out), to the extent feasible, of the Pedestrian and Bicycle Master Plan by 2020.

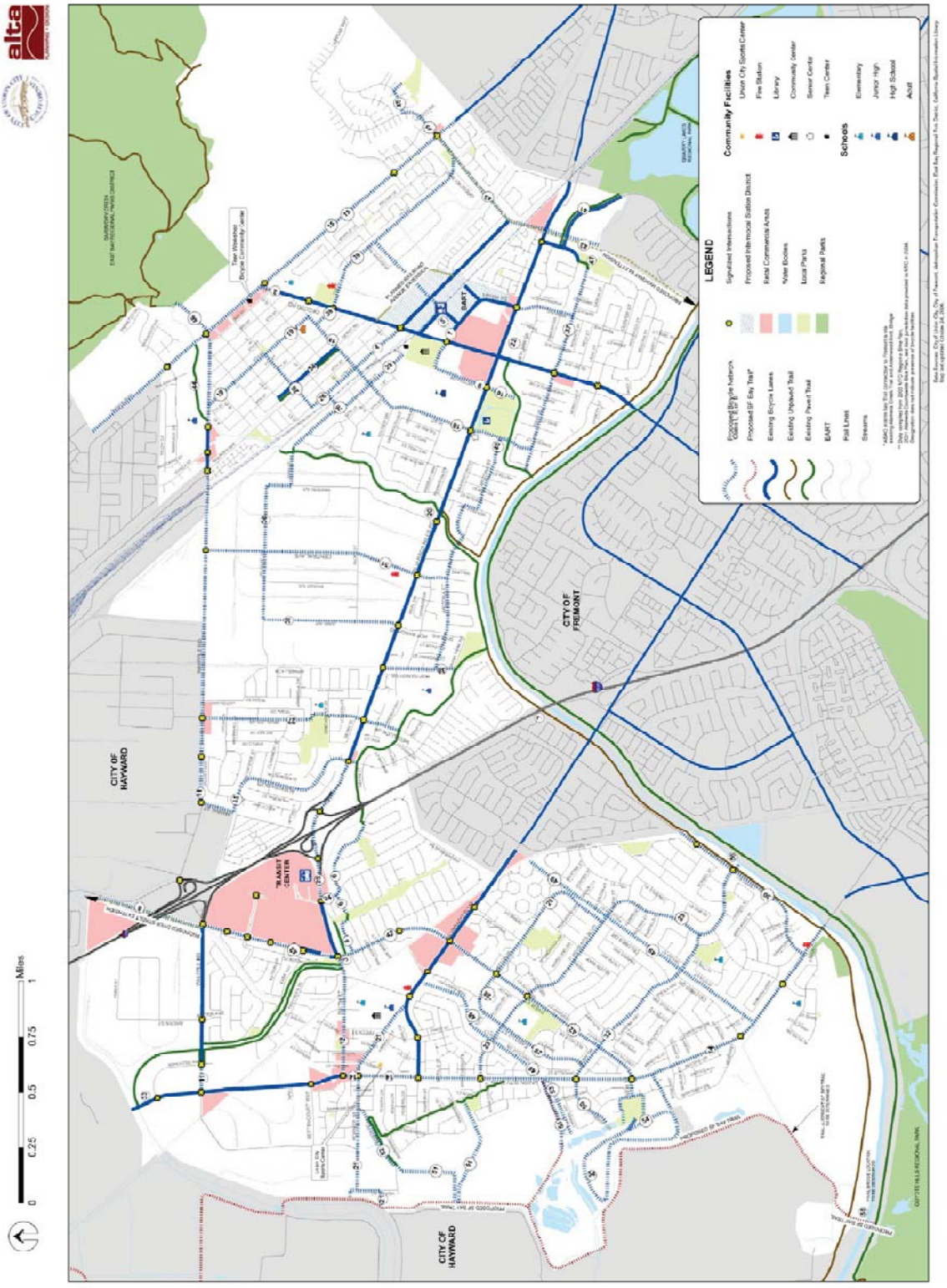
Walking or biking in place of driving reduces GHG emissions, increases personal fitness, and adds to the sense of community as more people interact on sidewalks and bike paths. In 2006, the City adopted the Pedestrian and Bicycle Master Plan (see Map T-1.1.1 for the existing and proposed bicycle infrastructure and Map T-1.1.2 for the existing and proposed pedestrian infrastructure on the following pages). The Plan provides a blueprint for developing a system of trails, bikeways, and other facilities for non-motorized users and intends to make bicycling and walking integral modes of transportation in the City.

The plan calls on the City to develop a planned bicycle route network that links residential neighborhoods, parks and open space areas, transit centers, schools, shopping areas, public facilities, major employment centers, and the regional bicycle network. This type of infrastructure will greatly encourage residents, employees, and visitors to use their bikes as an alternative travel mode. The City shall attempt to prioritize high quality (e.g., Class I) infrastructure on safe bike routes, as well as enhance bicycle storage and racks throughout the City.

In terms of pedestrian improvements, the plan directs the City to focus on implementation of traffic-calming projects and other necessary pedestrian safety improvements to enable walking to be an attractive travel mode. The City will also prioritize locations for Americans with Disabilities Act (ADA) improvements, including installation of curb ramps, closing sidewalk gaps, and removing sidewalk obstructions. All the actions noted below are part of the current Pedestrian and Bicycle Master Plan. The City is planning on reviewing and revising the Master Plan by October, 2011.

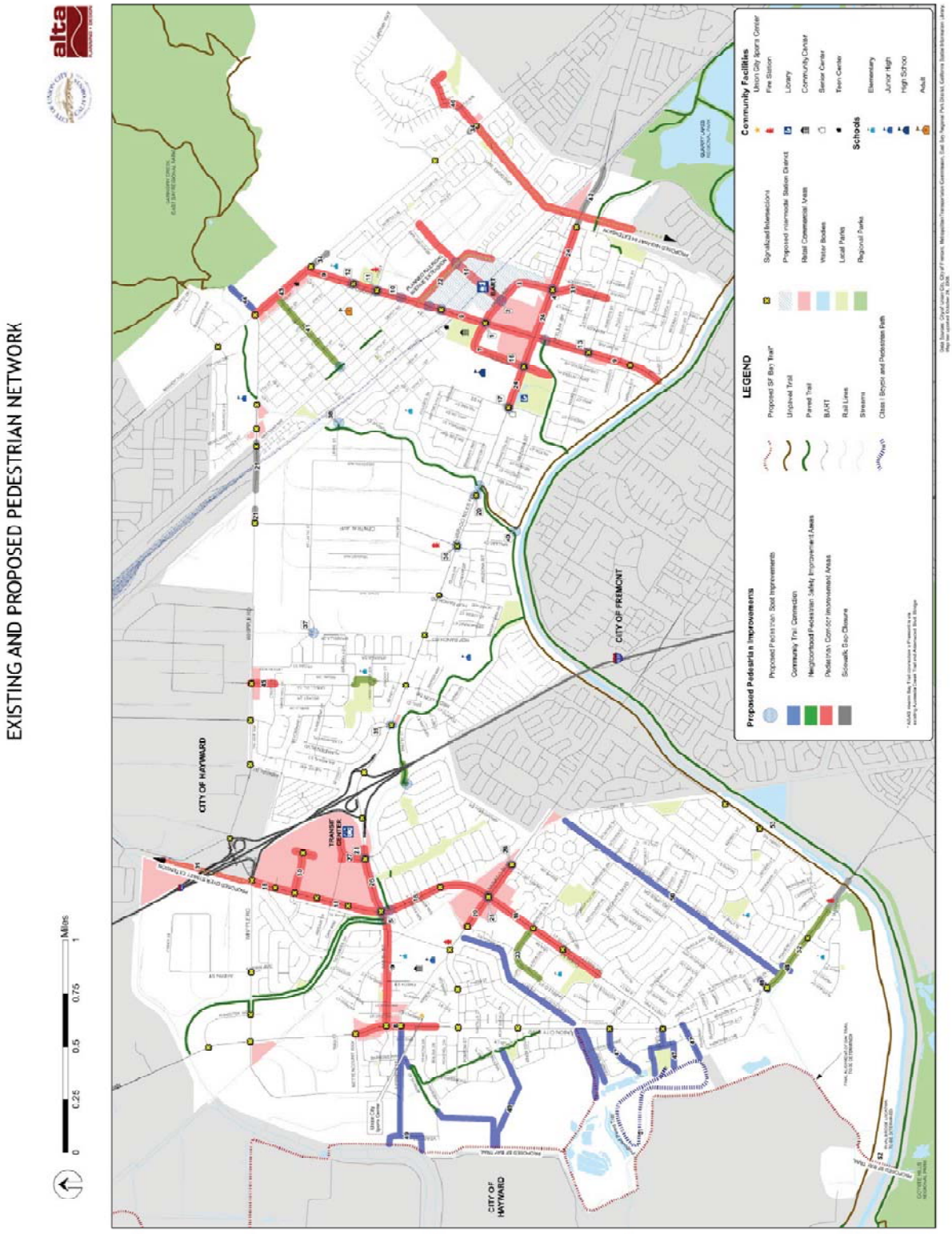
| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Conduct a comprehensive bicycle and pedestrian obstacle study to determine existing challenges, opportunities, and priority investments. | ECD<br>Public Works |
| **MEDIUM-TERM** | | |
| **B** | Implement a bicycle way finding / signage program. | ECD |
| **C** | Develop pedestrian infrastructure and traffic-calming projects to enable walking as an attractive travel mode. | ECD<br>Public Works |
| **D** | Develop appropriate bicycle infrastructure for high traffic street segments and intersections | ECD<br>Public Works |

| *Progress Indicators* | *Target* |
|---|---|
| 2020 bicycle-to-work mode share. | 2.0%<br>(from 0.5% in 2006) |
| 2020 walk-to-work mode share. | 3.5%<br>(from 1.3% in 2006) |




**Map T-1.1.1:** Existing and Proposed Bicycle Infrastructure

*Source: Union City General Plan, 2009.*




**Map T-1.1.2:** Existing and Proposed Pedestrian Infrastructure

*Source: Union City General Plan, 2009.*

# T-1: Walking and Bicycling

## Measure T-1.2: Work with New Haven Unified School District to maximize participation in Safe-Routes-to-School programs.

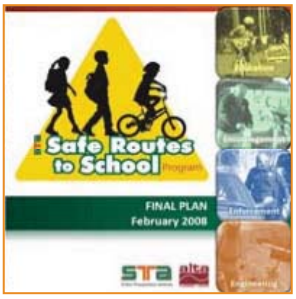
The Bay Area Transportation Survey, conducted in 2000 by the Metropolitan Transportation Commission, found that 29 percent of grade school children and 13 percent of high school students within the Southern Alameda County area (which includes Union City, Newark and Fremont) walk to school. Officials from Alvarado Middle School, Barnard-White Middle School, and Alvarado, Cabello, Delaine Eastin, and Kitayama Elementary schools estimate that more than 50 percent of their student body is already walking to school. However, there is still potential to increase student walking and biking exists at all schools in the City.

The City will continue to work with the New Haven Unified School District to increase participation in Safe-Routes-to-School programs and to improve walking and biking conditions near schools. Many schools report existing barriers to walking and bicycling such as heavy traffic, frequent speeding and unsafe street crossings. Several schools in the city do not have crossing guards, making walking and bicycling to school more of a safety issue for young students. As identified in Measure T-1.1, the City will invest in traffic calming and other pedestrian and bicycling infrastructure improvements throughout the city. These investments are especially important near the city's schools.

In 2003, Union City received a $500,000 Safe-Routes-to-School grant. The funding was used in conjunction with other funds for pedestrian improvements along portions of Whipple Road, from Railroad Avenue to Ithaca Street, and in front of Barnard-White Middle School. The City will partner with the School District to find additional sources of funding to invest in this important program area.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with New Haven Unified School District to pursue additional Safe-Routes-to-School grants and funding. | ECD<br>Public Works |
| **B** | Conduct study that identifies key barriers to walking and biking for school age students. | ECD<br>Public Works |
| **MEDIUM-TERM** | | |
| **C** | Implement priority infrastructure improvements that will improve walking and biking conditions for students. | Public Works |

| *Progress Indicators* | *Target* |
|---|---|
| Percentage of elementary school students that walk or bike to school. | 60% by 2015 |
| Percentage of high school students that walk or bike to school. | 40% by 2015 |




**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# T-2: Public Transit

## Measure 2.1: Provide transit priority and express routes on the Alvarado-Niles and Whipple corridors within the city.

Routes 1A and 1B (see Map T-2.1) operate Union City Transit's (UC Transit) most productive corridors in terms of passengers per hour. The City could attract additional riders along the Alvarado-Niles corridor by implementing express service and transit priority treatments. Transit priority upgrades could include: vehicles with three or more doors, traffic priority signals, "queue bypass" lanes, ticket vending machines enabling boarding through all doors, or low-floor vehicles enabling level boarding and alighting. UC Transit could also convert some existing runs to a "west side express" that would make only a few stops on Alvarado-Niles corridor between the Union Landing Transit Center and the BART station (Route 1A and 1B). The express service would provide an attractive option for commuters and could compete with auto travel times. This scenario expands on a Phase 2 (FY2013-2017) recommendation in the FY2008-2017 Short Range Transit Plan. UC Transit could also apply the same transit priority treatments to service in the Whipple corridor (Route 2). Some runs on Route 2 could also be converted to Limited Stop service.

By reducing vehicle delay, UC Transit could provide more service in the Alvarado-Niles corridor without the operating expense or added emissions of operating additional vehicles. Faster, more frequent service would serve to attract additional choice riders. Nelson Nygaard estimated that transit priority treatments in the Alvarado-Niles and Whipple corridors have the potential to increase productivity for Routes 1A, 1B, and 2 by up to 20 percent, yielding an additional 110,000 transit trips per year in 2020.

**GHG Reduction Potential**

80 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

High

**Cost to Resident or Business**

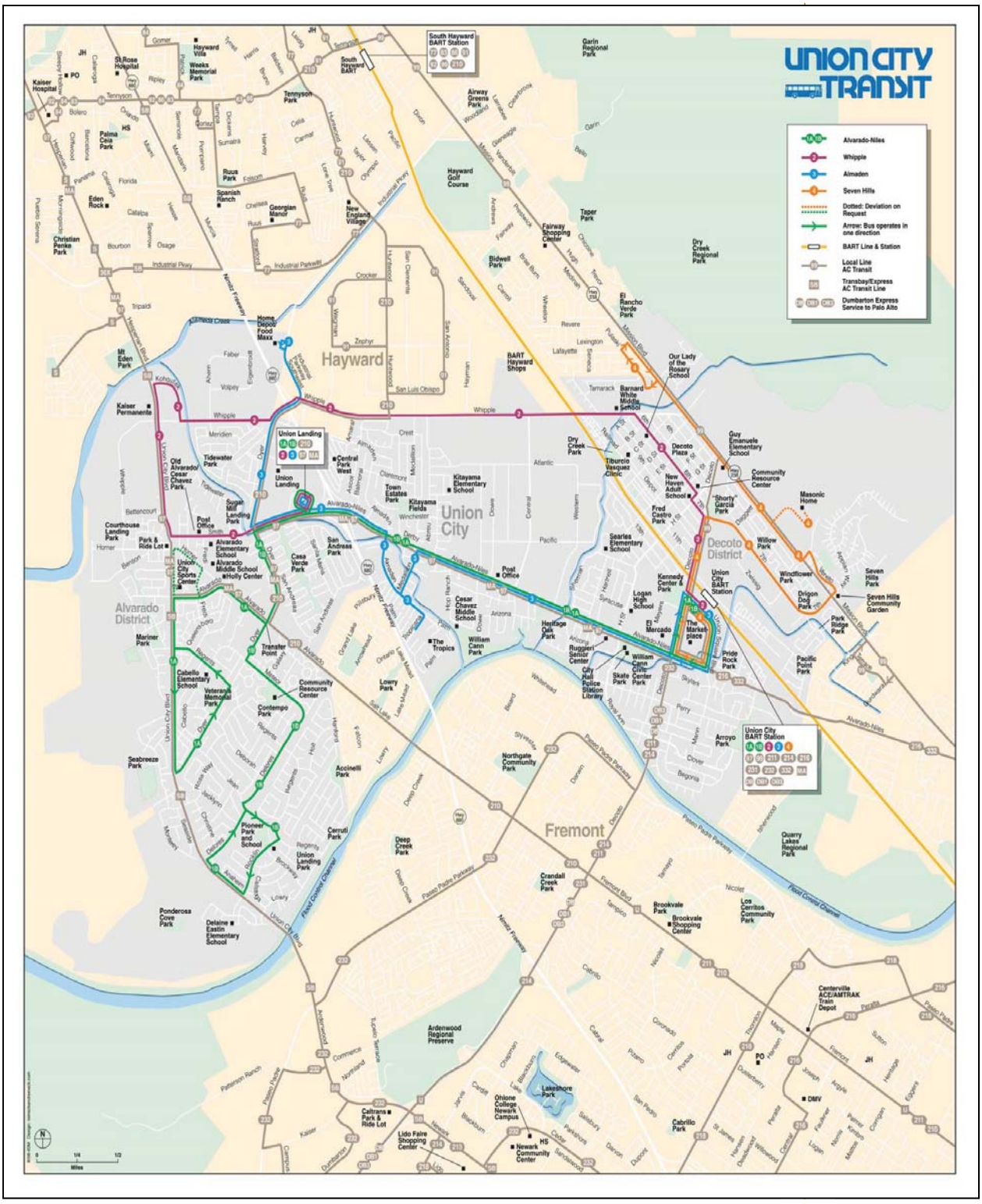
N/A

**Savings to Resident or Business**

N/A

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Convert some existing runs on Route 1A and 1B to express bus service and some runs on Route 2 to Limited Stop Service. | UC Transit |
| **MEDIUM-TERM** | | |
| **B** | Install transit priority signals and develop "queue bypass" lanes along Route 1A and 1B and Route 2. | Public Works |
| **C** | Invest in transit priority upgrades e.g., vehicles with three or more doors, ticket vending machines enabling boarding through all doors, or low-floor vehicles enabling level boarding and alighting. | UC Transit |

| *Progress Indicators* | *Target* |
|---|---|
| Additional transit trips on Route 1A , 1B, and 2 per year in 2020. | 73,000 additional transit trips per year |
| Reduction in VMT from the Route 1A , 1B, and 2 transit improvements in 2020. | 175,000 vehicle miles per year |




**Map T-2.1:** Existing UC Transit Lines

*Source: Union City Transit Route Guide & Timetables, August 2008.*

# T-2: Public Transit

## Measure 2.2: Convert bus fleet to compressed natural gas or hybrid vehicles.

Currently, UC Transit operates a mix of diesel and compressed natural gas (CNG) powered vehicles. In 2009, the City used approximately 90,000 gallons of diesel fuel and 40,000 gallon-equivalents of CNG. The CNG fuel that UC Transit uses produces approximately 28 percent fewer $CO_2$ emissions per gallon-equivalent than diesel.

In 2000, Union City adopted a resolution that requires all new transit vehicles to be CNG-powered. Assuming that the agency's fleet of transit vehicles is converted to CNG by 2020, the transition of fuel type will save approximately 270 metric tons of $CO_2$ per year.

A National Renewable Energy Laboratory (NREL) study conducted in 2003 and 2004 found that buses using hybrid technologies were 28 to 48 percent more fuel-efficient than diesel powered buses. While the City will continue its transition to CNG vehicles, it will also evaluate the potential to purchase hybrid buses for increased fuel efficiency and emissions reductions. Currently, hybrid buses are more expensive than a CNG powered bus.

**GHG Reduction Potential**

270 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Medium - High

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

| Action | Responsibility |
|---|---|
| **SHORT-TERM** | |
| **A** Evaluate potential of hybrid buses for the UC Transit fleet. | UC Transit |
| **MEDIUM -TERM** | |
| **B** Continue replacing remaining diesel-fueled transit vehicles to CNG or another low carbon fuel source. | UC Transit |
| ***Progress Indicators*** | ***Target*** |
| Percent of UC Transit vehicles fuel by compressed natural gas or hybrid vehicles. | 100% by 2020 |

# T-2: Public Transit

## Measure T-2.3: Improve ease of use of transit system.

Numerous barriers currently exist that discourage the public from traveling on buses, BART, and other forms of transit. Improving the comfort and ease of use of the UC Transit system, as well as regionally with AC Transit, BART, and others, will create an enhanced public transit environment.

One barrier facing transit riders is that long-distance commutes often require riders to purchase multiple tickets for the different transit services they utilize. The City will support UC Transit in its integration into the Clipper universal transit pass program that links with AC Transit, BART, and other relevant regional transit agencies. The City will consider establishing a free or reduced fee transfer system to facilitate interconnections between transit systems.

Research demonstrates that the provision of transit stop amenities can considerably increase ridership numbers. The City shall consider providing bus shelters, shade trees, route information, benches, and lighting at priority bus stops. The City will also encourage BART to expand bicycle facilities at the Union City BART station. Addition of bicycle ramps and Class I enclosed bicycle storage facilities at the station could increase the number of Union City residents or employees willing to ride to BART.

The City will also work with regional transit agencies to expand express bus services to regional employment centers. The City will conduct a survey to determine additional demand for express bus service and create a plan to meet these needs.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Continue pursuing integration into the Clipper universal transit pass program for the community and regional riders. | UC Transit |
| **MEDIUM-TERM** | | |
| **B** | Implement bus stop improvements (e.g., shelters, benches, and lighting) at priority bus stops. | UC Transit<br>Public Works |
| **C** | Improve the accommodation of bicycles on UC Transit buses (i.e., increase bicycle capacity) and work with BART to expand bike access at the BART station (e.g., bicycle ramps, Class I storage facilities). | UC Transit |
| **D** | Conduct a survey to establish demand for additional express bus services to major regional employment centers and create plan to fill existing gaps. | UC Transit |

| *Progress Indicators* | *Target* |
|---|---|
| Bus stops with enhanced amenities (e.g., shelters, shade trees, route information, benches, and lighting). | 25 by 2015<br>50 by 2020 |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

High

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# T-3: Transportation Demand Management

## Measure 3.1: Increase participation by employers in transportation demand management programs.

Transportation demand management (TDM) is a series of strategies that aim to reduce single-occupancy automobile trips. Frequently these strategies target the commute trips associated with employment within a community. The primary measures that Union City will emphasize within its TDM program are rideshare, subsidized transit passes, and telecommuting and compressed work schedules.

To implement these strategies, the City will need to establish a position that manages the implementation of these transportation demand management programs who can also oversee other sustainability programs within the City. The City will also help establish a Union City Transportation Management Association (UCTMA), a non-profit organization made up of community employers, whose primary purpose is to increase the availability of alternative travel choices within the community for their employees. The UCTMA will offer training seminars to help member employers develop effective commute option programs. Additionally, UCTMA will promote the 511 rideshare database and other benefits such as bulk transit pass purchases, as well as advocate for the development of rideshare infrastructure and supporting services in local and regional transit/transportation planning processes. The City will attempt to partner with adjacent jurisdictions in developing this program in order to take advantage of scale efficiencies.

**GHG Reduction Potential**

540 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

Medium - High

**Savings to Resident or Business**

Medium - High

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Establish a TDM coordinator position within the City. | ECD |
| **B** | Facilitate the development of an employer-run Union City Transportation Management Association. | ECD |

| *Progress Indicators* | *Target* |
|---|---|
| Reduction in single-occupancy automobile commute trips.<br><br>*Single-occupancy vehicle data can be obtained through MTC.* | 10% reduction to reach 63% by 2020 (from current level of 73%) |

# T-3: Transportation Demand Management

## Measure 3.2: Enhance rideshare infrastructure to facilitate community participation.

Union City's location in the Bay Area makes ridesharing an attractive travel mode for commuters. Ridesharing currently comprises 16 percent of all commute trips while single-occupancy vehicle trips make up 73 percent. The City seeks to improve upon the community's already impressive level of rideshare participation and further increase participation by 2020.

The City will work with the Alameda County Transportation Commission, the proposed Union City Transportation Management Association (UCTMA), the Metropolitan Transportation Commission (MTC), and other relevant agencies to facilitate ridesharing opportunities, which include both carpooling and vanpooling. Specifically the new TDM position will work with partners to upgrade ride-matching systems to utilize the most current technologies (e.g., cell phone enabled ride-match applications), and develop a ride-match social networking website; online electronic payment options; and rideshare stations that provide covered shelter, lighting, and secure bicycle parking. The City will also work to improve rideshare-parking privileges, by providing preferential parking at all public lots and requiring preferential parking spaces for ridesharing vehicles in all new office or commercial development with 50 or more employees.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with Alameda County Transportation Commission and MTC to develop a plan and schedule for updating ride-match systems to the most advanced technologies. | ECD |
| **B** | Work with UCTMA and Alameda County Transportation Commission to encourage employers to create rideshare databases for their employees and employees of adjacent businesses. | ECD |
| **C** | Adopt an ordinance that requires new offices with 50 or more employees to provide preferential parking spaces for ride-share commuters. | ECD |
| **MEDIUM-TERM** | | |
| **D** | Identify locations for community ride-share stations and develop appropriate infrastructure. | ECD<br>Public Works |

| *Progress Indicators* | *Target* |
|---|---|
| Percentage of commuters who carpool or vanpool. | 20% by 2020 |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Medium

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# T-4: Transportation Policies

## Measure 4.1: Ensure that City policies and budgetary processes facilitate a multi-modal transportation system within the community.

Many cities have existing policies and budgetary processes that inadvertently promote driving at the expense of alternative travel modes such as walking, biking, and public transit. Union City will review its street and intersection construction standards, level-of-service (LOS) standards, and transportation budget allocation process in order to facilitate an effective multi-modal transportation system in the community.

The City will also consider revising existing street and intersection construction standards for new and major retrofit projects to accommodate multiple modes of transit. The City will explore developing a multi-modal LOS standard that supports infill development and smart growth. This will be accomplished by encouraging roadway LOS ratings to decline provided that LOS ratings for other modes improve, as well as through development fees to finance non-motorized and public transit improvements. The City will revise its transportation budget allocation process to ensure balanced investment in walking, biking, public transit, carpooling, and automobile use.

The City will also consider adoption of a complete streets policy, which should:

- Specify that 'all users' includes pedestrians, bicyclists, and transit passengers of all ages and abilities, as well as trucks, buses, and automobiles.
- Encourage street connectivity and aims to create a comprehensive, integrated, connected network for all modes.
- Apply to both new and retrofit projects, including design, planning, and operations, for the entire right-of-way.
- Direct the use of the latest and best design criteria and guidelines while recognizing the need for flexibility in balancing user needs.
- Ensure that complete streets solutions complement the community context.

In addition to these revisions, the City will partner with other Bay Area cities and counties and agencies to advocate for regional and State transportation strategies for reducing GHG emissions (e.g., congestion pricing, pay-as-you-drive insurance, or carbon tax).

| | Action | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Evaluate a complete streets policy and consider revising existing street construction standards for new and major retrofit projects to accommodate multiple transit modes. | ECD<br>Public Works |
| **B** | Explore developing multi-modal LOS standards. | ECD<br>Public Works |
| **C** | Adopt a resolution that directs the City to balance investment in walking, biking, public transit, carpooling, and automobile use. | City Council<br>ECD<br>Public Works |
| **D** | Advocate for regional and State transportation strategies for reducing GHG emissions. | City Council |

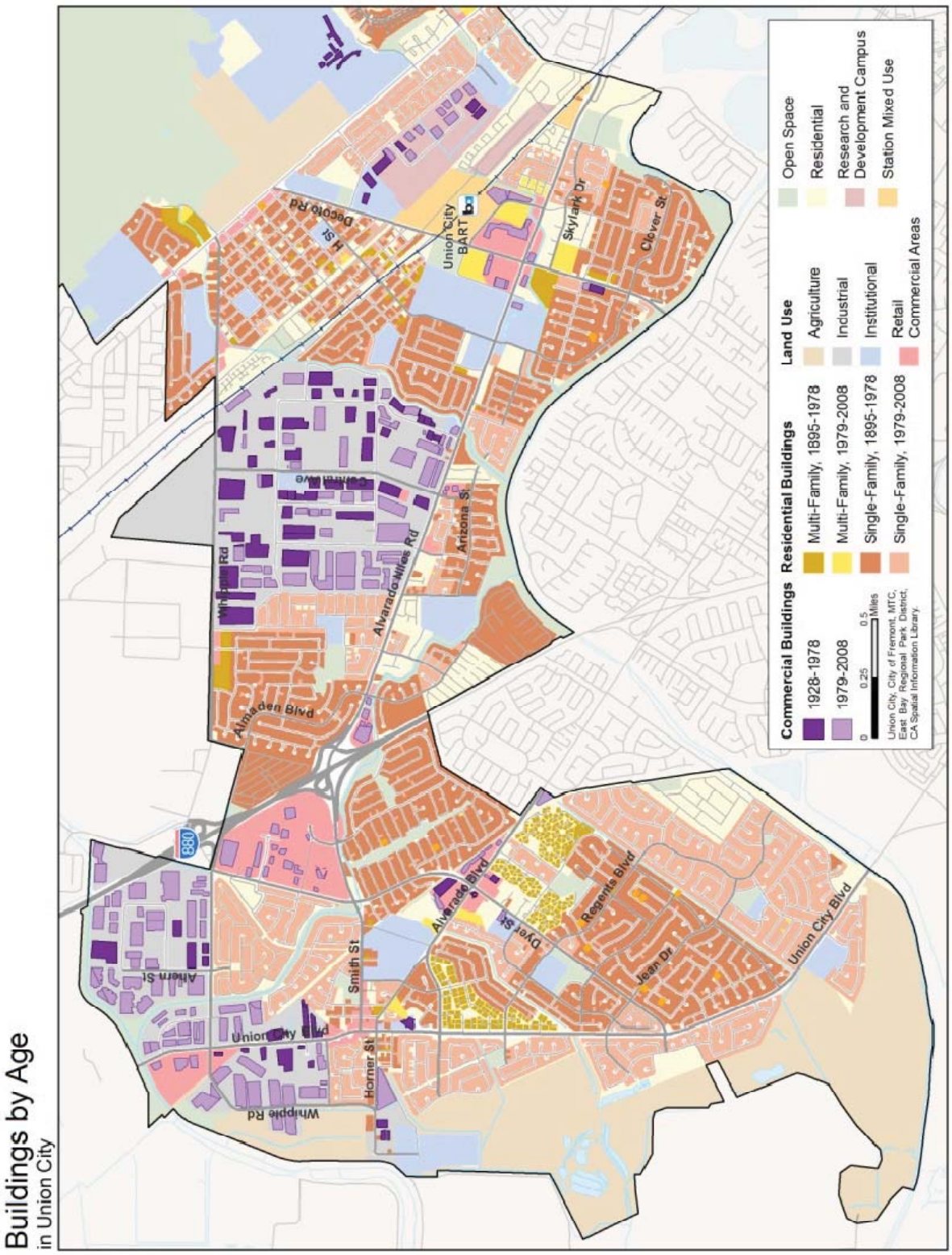
# Buildings and Energy

The consumption of electricity for appliances, lighting and cooling, and combustion of natural gas for heating, cooking, and other processes within residential, commercial, and industrial buildings generates nearly half of Union City's GHG emissions (193,823 MT $CO_2$e/yr in 2020). These emissions can be reduced through improving energy efficiency and increasing the amount of electricity and heat generated from renewable energy sources.

In Union City, nearly 40 percent of the housing stock, and a similar percentage of commercial and industrial buildings, were built before California's energy code, Title 24 Part 6, came into force in the 1980s (see Map E-1 showing the city's building inventory). Consequently, the building stock offers considerable opportunity for cost-effective energy efficiency retrofits to decrease the use of both electricity and natural gas. The City plans to achieve building energy efficiency improvements in both existing and new buildings through a combination of education, incentives, and regulations.

Nearly half of the electric power mix provided to customers by PG&E in 2008 was generated by fossil fuels (eight percent by coal and 39 percent by natural gas), with the remainder from nuclear, hydroelectric, and renewables. To increase the portion of Union City's energy portfolio met through renewables, the City will encourage the installation of rooftop solar photovoltaic and solar hot water systems, both of which are effective technologies in the sunny climate of Union City.

The total GHG emission reduction potential of the Buildings and Energy Action Area is estimated to be 26,320 MT $CO_2$e/yr in 2020, or approximately 26 percent of the total reductions achieved by the CAP.




**Map E-1:** 2010 Building Inventory in Union City

*Source: Union City General Plan; AECOM.*

# E-1: Residential Energy Retrofits

## Measure E-1.1: Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to homeowners.

The City will develop a comprehensive program that encourages homeowners to implement energy efficiency retrofits through outreach and low-cost financing. Many residences (approximately 70 percent) in Union City are owner–occupied, and thus the financial savings of home energy efficiency retrofits are in the long-term economic interest of the homeowner. As such, the City shall emphasize voluntary participation in energy efficiency retrofit programs, in lieu of mandatory programs. To encourage participation from residential homeowners, the City will leverage Energy Upgrade California's educational materials and online platform that provides access to incentives, technical assistance, and qualified contractors. The City will also promote resources such as California Flex Your Power, the Department of Energy's (DOE) Weatherization Assistance Program, and PG&E's SmartEnergy Analyzer™ program, all of which link residential property owners to educational and financial resources. See Chapter 4 and Appendix C for more details on these and other relevant programs.

Financing is critical to the success of the energy efficiency program. The City will continue to support the development of a Property Assessed Clean Energy (PACE) program to further promote energy efficiency retrofits, which would allow qualified residential property owners to repay the cost of energy efficiency retrofits on their property tax bill. See Chapter 4 for more details on this type of program. Conventional means, such as home equity loans, are also available for financing energy efficiency retrofits.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with ABAG, PG&E, and other organizations to develop and implement Energy Upgrade California program for residential property owners. | ECD |
| **B** | Leverage Energy Upgrade California outreach and educational materials to encourage energy efficiency retrofits and the use of energy efficient, low-carbon, or renewable technologies. | ECD |
| **C** | Promote residential conservation strategies as outlined by the utilities, and other industry sources. | ECD |
| **D** | Continue supporting the development of a low-cost PACE financing program to encourage investment in energy efficiency retrofits. | ECD |
| **E** | Facilitate the use of energy efficient demonstration homes as an education and promotion tool. | ECD |
| ***Progress Indicators*** | | |
| Percentage of residential buildings that have implemented an energy efficiency retrofit (see Appendices B & D for more details on energy conservation measures and analysis). | | 15% of existing residential by 2020 |
| *Monitoring through PG&E and EPA rebate programs, and Energy Upgrade California.* | | |

**GHG Reduction Potential**

2,120 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

Low

**Savings to Resident or Business**

Very Low

**Payback to Resident or Business**

Short

**GHG Reduction Potential**

2,200 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

Varies depending on appliance

**Savings to Resident or Business**

Varies depending on appliance

**Payback to Resident or Business**

Short - Medium

# E-2: Household Appliances

## Measure E-2.1: Work with PG&E to promote existing household appliance upgrades.

This measure is designed to encourage voluntary community participation to upgrade home appliances and lighting to Energy Star or other energy efficient models. Successful implementation of this measure relies on leveraging the Energy Upgrade California program materials and public platform through a public outreach campaign (in combination with the programs in E-1.1 and E-3.1) to increase community awareness regarding energy efficient appliance choices.

Modern technology has contributed to the development of high-quality, energy efficient appliances. The Energy Star rating is an internationally recognized standard for energy efficient consumer products. According to the EPA, devices that have an Energy Star certification, such as office equipment, home appliances, and lighting products, generally use 20 to 30 percent less energy than required by federal standards.

By promoting Energy Star-rated home and business appliances, the City can help to reduce GHG emissions related to the use of lighting, refrigerators, dishwashers, clothes washers, wall air conditioning units, computers, photocopiers, lights, etc.

The City will partner with PG&E, ACWD, and other relevant organizations to promote existing financial incentives and rebates for energy efficient appliance upgrades and replacements.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Leverage Energy Upgrade California platform to promote Energy Star appliances and electronics. | ECD |
| **MEDIUM-TERM** | | |
| **B** | Collaborate with PG&E, ACWD, and other non-profit organizations to promote existing financial incentives programs to encourage voluntary replacement of inefficient appliances with new Energy Star appliances. | ECD |

### *Progress Indicators*

| | |
|---|---|
| Percentage of approved rebate applications for Energy Star appliances.<br>*Monitoring through PG&E and EPA rebate programs, and Energy Upgrade California.* | Percentage of Buildings<br>Refrigerators: 10%<br>Dishwashers: 10%<br>Clothes Washers: 10%<br>Light Bulbs (CFLs): 50% |

# E-3: Commercial Energy Retrofits

## Measure E-3.1: Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners.

Similar to the residential housing stock, a significant percentage of the city's industrial and commercial buildings were constructed prior to the adoption of California's Title 24 energy standards in the 1980s. See Map E-3.1 for non-residential building inventory.

The City will develop a comprehensive energy efficiency program that encourages commercial and industrial building owners to implement energy efficiency retrofits through outreach and low-cost financing. To encourage participation, the City will promote resources such as California Flex Your Power, EPA's Portfolio Manager, and other DOE and EPA resources, which can link commercial and industrial building owners to educational and financial resources.

Financing is critical to the success of the energy efficiency program. The City will continue to support the development of a Property Assessed Clean Energy (PACE) program to further promote energy efficiency retrofits, which would allow qualified commercial property owners to repay the cost of energy efficiency retrofits on their property tax bill. See Chapter 4 for more details on this type of program. Conventional means, such as debt financing, are also available for financing energy efficiency retrofits.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Continue supporting the development of a low-cost PACE financing program to encourage investment in energy efficiency retrofits. | ECD |
| **B** | Encourage energy efficiency retrofits and the use of energy efficient, low-carbon, or renewable technologies through education and outreach, targeted at the business community through materials and resources available on the City website, as well as complimentary materials available at City-sponsored and other targeted events. | ECD |
| **MEDIUM-TERM** | | |
| **C** | Encourage small businesses to access PG&E programs that provides technical assistance and access to incentives for energy efficiency upgrades (e.g., refrigeration, HVAC, and lighting). | ECD |

### *Progress Indicators*

| | |
|---|---|
| Percentage of buildings that have implemented an energy efficiency retrofit (see Appendix B &D for more details on energy conservation measures and analysis).<br>*Monitoring through Building Department permit process, PG&E and EPA rebates, and Energy Upgrade California.* | 15% of existing commercial and industrial buildings by 2020 |

**GHG Reduction Potential**

1,450 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

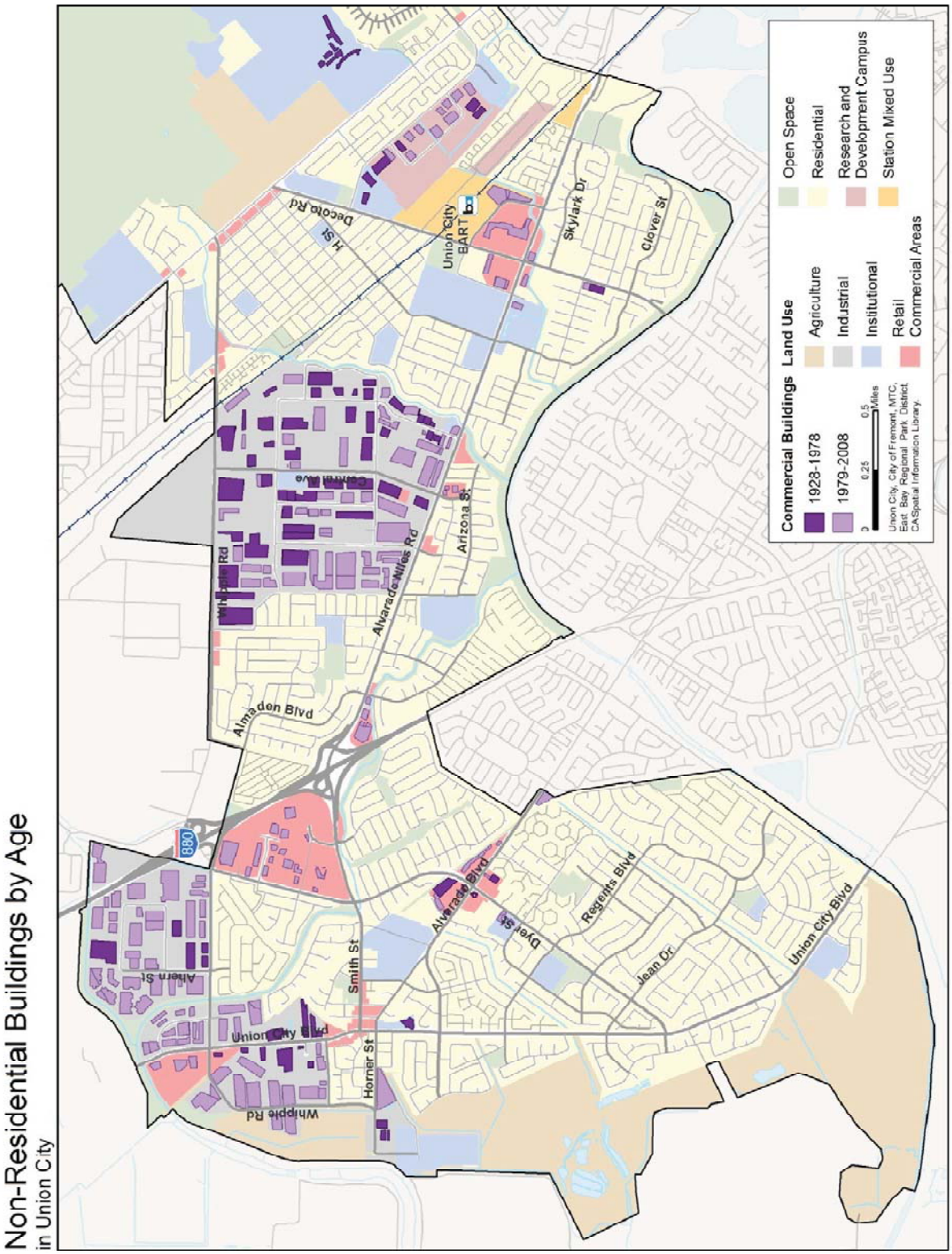
Low

**Savings to Resident or Business**

Low

**Payback to Resident or Business**

Long




**Map E-3.1:** Non-Residential Buildings in Union City

*Source: Union City General Plan; AECOM.*

# E-3: Commercial Energy Retrofits

## Measure E-3.2: Promote 'Cool Roofs' to mitigate the urban heat island effect and reduce air conditioning use.

The urban heat island effect describes the phenomena in which urban areas are hotter than nearby rural areas. Urban heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and GHG emissions, and heat-related illness and mortality. 'Cool roofs' are made of materials with higher solar reflectivity, which mitigate the urban heat island effect and reduce cooling loads during hot days. In contrast, dark roofs absorb heat from the sun, which elevates urban temperatures and increases demand for air conditioning. According to the Lawrence Berkeley National Laboratory Urban Heat Island Group, replacing a 100 square meter (~1,076 square feet) black or grey roof with cool roof technology can reduce GHG emissions by approximately five MT $CO_2$e/year and urban surface temperatures up to three degrees.

According to the EPA, the cost premium for cool roofs versus conventional roofing materials ranges from zero to 10 cents per square foot for most products, or from 10 to 20 cents per square foot for a built-up roof with a cool coating used in place of smooth asphalt or aluminum coating. According to PG&E, customers with cool roofs reduce their air conditioning usage by an average of 10 to 20 percent, which will reduce their electric bill by five to 10 percent during the warm summer months. Another study found that cool roofs provide an average yearly net savings of almost 50 cents per square foot.

Cool roofs are already mandatory in order for new construction to comply with Tier 1 or Tier 2 energy standards under CALGreen (Section A4.304.4 for residential and A5.304.4 for non-residential). Along with the energy efficiency retrofit programs described in E-3.1, the City will promote cool roof technology, and will target the outreach efforts to the owners of the appropriate existing building types. As financing is critical to the success of the cool roof program, the City will also promote the financing programs and resources described in measure E-3.1. In addition to federal rebate programs, PG&E offers a rebate program for cool roof technology, which as of 2010 was set at $0.20/square foot.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Promote 'cool roof' technology through education and outreach, targeted to the community through materials and resources available on the City website, as well as complimentary materials available at City-sponsored and other public events. | ECD |
| **MEDIUM-TERM** | | |
| **B** | Leverage actions B and C in measure E-3.1 to promote 'cool roof' technology. | ECD |

| *Progress Indicators* | |
|---|---|
| Square feet of building roof space (and percentage) that has been converted to a 'cool roof.' Only commercial and retail buildings with cooling load have been considered. | ~1,000,000 sq. ft. roof space (~20% of buildings) by 2020 |

**GHG Reduction Potential**

4,510 MT $CO_2$e/year

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

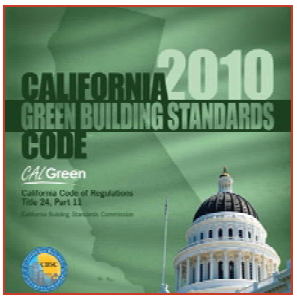
Low - Medium

**Savings to Resident or Business**

Medium

**Payback to Resident or Business**

Very Short




**GHG Reduction Potential**

1,860 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

N/A

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Medium

# E-4: Building Performance Standards for New Construction

## Measure E-4.1: Continue to implement the Green Building Ordinance.

The City's current Green Building Ordinance stipulates that new residential projects must be certified under Build It Green's Green Point rated system; new non-residential projects must comply with Stopwaste.Org's Alameda County Small Commercial Green Building Checklist; and new City-sponsored public-private partnership projects over $3 million must achieve a Silver rating in the US Green Building Council's LEED-rating system. Each of these systems includes a requirement to achieve a specified energy efficiency benchmark. In the Green Point Rated standard, section J.1.a states that a residential project is required to "exceed Title 24 standards by a minimum of 15 percent". The Small Commercial Green Building Checklist requires that a project "exceed Title 24 standards by a minimum of 10 percent." The LEED-New Construction rating system contains a requirement within the Energy and Atmosphere section - EA Credit 1: Optimize Energy Performance, which offers two compliance pathways: Option 1 - Whole Building Energy Simulation or Option 2 - Prescriptive Compliance Path. Option 1 requires a minimum building energy performance of 12 percent better than ASHRAE Standard 90.1-2007, whereas Option 2 offers a prescriptive list of energy conservation measures.

The City has already implemented this ordinance, which will serve to increase the energy efficiency of new residential and commercial buildings and could considerably reduce homeowners' and businesses' energy bills.

| Action | | Responsibility |
|---|---|---|
| **ACHIEVED** | | |
| **A** | Implementation of the City's Green Building Ordinance. | ECD |

# E-5: Smart Grid

## Measure E-5.1: Work with PG&E and other cities in Alameda County to accelerate Smart Grid integration in existing and new buildings.

The 'smart grid' is an emerging energy management system which uses information technology to significantly improve how electricity is managed and controlled. Smart meters, which use a technology that enables users to take full advantage of the smart grid, will eventually provide utility customers with access to detailed energy use and cost information, new dynamic pricing programs based on peak-energy demand, and the ability to program home appliances and devices to respond to energy use preferences based on cost, comfort, and convenience.

As of October 2010, PG&E had installed over 42,000 smart meters in Union City, covering close to 100 percent of the community's residences and businesses. Current smart meters allow for frequent remote reading of energy usage by PG&E. However, the true value of the smart meter program will be fully realized when community residents and businesses begin making more informed energy use decisions based on the two-way communication enabled by smart meters, such as when a homeowner is able to program their washing machine to run when energy is cheapest to obtain.

When estimating the potential GHG emission reductions associated with implementation of the smart grid, the City included the energy efficiency improvements gained from integrating smart grid energy management systems for control lighting, heating, ventilation, and air conditioning and other major appliances in residential and commercial buildings.

According to CISCO, a world-wide leader in network technology, full integration of the smart grid will take time to realize, but energy analysts estimate it will ultimately be capable of reducing electricity-related GHG emissions by 30 percent below current levels.

| Action | | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Develop an outreach program with PG&E that informs property owners and businesses about smart grid and smart appliance technologies, as well as energy conservation opportunities using smart meter technology. | ECD |

**GHG Reduction Potential**

3,550 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

Medium - High

**Savings to Resident or Business**

Low

**GHG Reduction Potential**

4,170 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

Low

**Savings to Resident or Business**

Low

**Payback to Resident or Business**

Long

# E-6: Residential Solar Hot Water

## Measure E-6.1: Develop program to facilitate the installation of solar hot water heaters in existing and new residential development.

Solar hot water systems are a simple, reliable, and cost-effective method for harnessing the sun's energy to provide for hot water needs. Solar collectors, usually placed on the roof, absorb the sun's energy to heat water that is stored in a water tank. The demonstrated efficiency is as high as 87 percent (Environment California Research & Policy Center) meaning very little solar energy is lost in the process.

The State of California has recognized the value of solar hot water heaters. The California Solar Water Heating and Efficiency Act of 2007 (AB 1470), created a 10-year program aimed at installing solar water heaters in homes and businesses. AB 1470 was designed to lower the initial costs of purchasing a system, which averages around $3,000-$6,000.

Solar hot water systems can also be a cost-effective replacement for inefficient water heaters. According to the California Solar Initiative (CSI), a state-wide effort to promote solar systems through outreach, education, and incentives, solar hot water systems can lower energy bills by meeting 50 to 80 percent of hot water needs over a year. Though the high capital cost of solar water heater upgrades can pose a financial burden to homeowners, there are a range of financing and rebate options to offset these initial investment costs.

The City will collaborate with PG&E and other non-profit organizations to identify the appropriate financing and rebate options for residents to voluntarily replace inefficient water heating systems with solar water heaters. There are a number of financing options that may be used to reduce upfront costs, such as a PACE program, federal tax incentives through the Energy Policy Act of 2005, and financial incentives through AB 1470. The City will work with PG&E and the California Solar Initiative to create outreach programs to provide information about the benefits of solar hot water heaters to encourage participation.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with PG&E and California Solar Initiative to develop an outreach program to maximize installation of solar hot water systems in residential buildings. | ECD |
| **B** | Encourage the use of California Solar Initiative, US EPA, PG&E, and other rebates for solar hot water heaters. | ECD |
| **C** | Streamline permitting (e.g., building, electric, plumbing) for solar hot water system installation. | ECD |

| *Progress Indicators* | |
|---|---|
| Percentage of residences that have installed a solar hot water system. | 35% of residences with solar hot water by 2020 |

# E-7: Solar Power

## Measure E-7.1: Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to homeowners.

Solar photovoltaic (PV) systems generate electrical power by converting solar radiation into direct current electricity using semiconductors. PV power generation employs solar panels comprised of cells containing photovoltaic material. PV systems can be retrofitted into existing buildings, usually by mounting them on an existing roof structure or walls. Union City has an excellent solar potential of approximately 5.43 kWh/$m^2$/day, which is sufficient to support a solar PV installation that would cover a large percentage of an average home's electricity demand (see solar map of the United States in E-7.2).

The City will develop a comprehensive solar PV program that encourages homeowners to install PV systems through outreach and low-cost financing. Outreach efforts will aim to maximize community participation, and encourage homeowners to leverage the Energy Upgrade California program which consists of educational materials; links to technical assistance and rebates; as well as an online platform (see Chapter 4 for more program details). The City can use materials from the California Solar Initiative (CSI), as well as encourage homeowners to request free audits provided by private solar financing and installation companies. To date, CSI has facilitated the installation of 30.8 Megawatts (MW) of solar PV in Alameda County. According the National Renewable Energy Laboratory's Open PV Project (openpv.nrel.gov), Union City contains 32 solar PV installations, with a total capacity of approximately 540 kW.

Financing is critical to the success of the solar PV program. The City will continue to support the development of a Property Assessed Clean Energy (PACE) program to further promote renewable energy systems, which would allow qualified residential property owners to repay the cost of renewable energy generation systems on their property tax bill. See Chapter 4 for more details on this type of program. There are other financing models such as power purchase agreements (PPAs) which can be used to offset the initial capital cost of installing a solar PV system (see Chapter 4 for financing model description). Homeowners will be able to finance the renewable systems through accessing a variety of financing programs and options, and also will be able to capitalize on additional rebates through the California Solar Initiative.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Identify methods to expand solar PV in the city, which may include incentives such as reduced fees and technical assistance. | ECD |
| **B** | Work with ABAG to develop and implement the Energy Upgrade California program, which will provide access to financing for residential renewable energy systems. | ECD |
| ***Progress Indicators*** | | |
| Percentage of residences that have installed a renewable energy system. | | 25% of residences with solar PV by 2020 |

**GHG Reduction Potential**

2,990 MT $CO_2$e/year

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

High

**Savings to Resident or Business**

Medium

**Payback to Resident or Business**

Long

**GHG Reduction Potential**

2,910 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

High

**Savings to Resident or Business**

High

**Payback to Resident or Business**

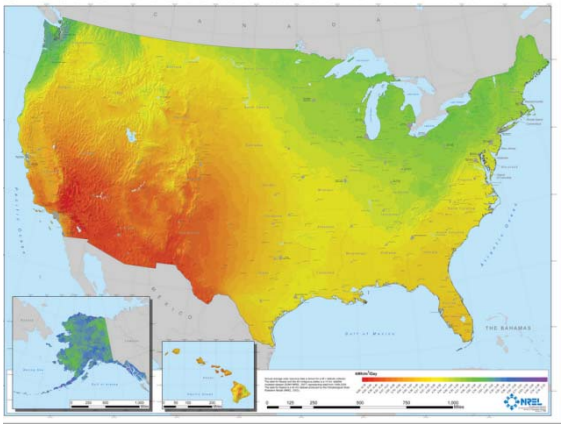
Long

# E-7: Solar Power

## Measure E-7.2: Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners.

The City will develop a comprehensive renewable energy program that encourages building owners to install solar PV systems through outreach and low-cost financing. To encourage participation, the City will use materials from the California Solar Initiative to reach out to commercial and industrial building owners. See E-7.1 for solar potential of Union City and below for the National Renewable Energy Laboratory map comparing solar potential nationally.

Financing is critical to the success of the solar PV program. The City will continue to support the development of a Property Assessed Clean Energy (PACE) program to further promote renewable energy systems, which would allow qualified property owners to repay the cost of energy efficiency retrofits on their property tax bill. See Chapter 4 for more details on this type of program. The CSI rebate program can be used in addition to the PACE financing.




To further facilitate participation, the City will consider a reduced fee for PV system installation. According to solar industry experts, 20,000 square feet represents the scale at which certain lease options become financially viable, though there are other financial mechanisms that can be employed at smaller scales. See Map E-7 for the solar PV potential on commercial roofs greater than 20,000 square feet.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Identify methods to expand solar PV in the city, which may include incentives such as reduced fees and technical assistance. | ECD |
| **B** | Work with ABAG to develop and implement the Energy Upgrade California program, which will provide access to financing for non-residential renewable energy systems. | ECD |
| **C** | Explore opportunities in the New Haven Unified School District for solar PV demonstration installations. | ECD |

| *Progress Indicators* | |
|---|---|
| Percentage of commercial and industrial buildings that have installed a renewable energy system. | 25% of buildings with solar PV by 2020 |

# E-7: Solar Power

## Measure E-7.3: Develop a "Solar Cities" style public outreach and education platform to promote renewable energy systems for homes and businesses.

To support measures E-7.1 and E-7.2, the City will develop a "Solar Cities" style (www.SolarCitiesNow.com) public outreach and education platform to promote renewable energy systems for homes and businesses. Solar Cities is a joint project of the cities of Livermore, Pleasanton, and Dublin that is focused on educating consumers about residential solar energy. Building on the experience of this program, Union City will develop a similar program, which could feature educational workshops, web resources, and targeted information to assist homeowners in making decisions about solar installations. This approach would benefit from the participation of the neighboring cities of Fremont, Newark, and Hayward.

In collaboration with the CSI, the City will develop workshops with the purpose of educating consumers about solar energy systems, the incentive and rebate programs offered through the CSI and federal tax credits, and provide them with an opportunity to meet professionals working in the industry. Other resources that could be included are website links to a consumer's guide, information about qualified solar installers, solar calculators, etc. The City will also offer solar installers networking opportunities with residents interested in exploring solar systems (see E-7.1 & E-7.2).

| | Action | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Develop a Solar Cities-style program that features educational workshops, web resources, and targeted information to assist property owners in making decisions about investing in a solar PV system. | ECD |
| **B** | In collaboration with California Solar Initiative, develop workshops for the public. The purpose of the workshops is to educate consumers about solar energy systems, the incentive and rebate programs, and provide them with an opportunity to meet professionals working in the industry. | ECD |
| **C** | Work with qualified/approved solar financing and installation companies to identify opportunities to aggregate residential and non-residential customers in order to negotiate preferable contract terms. | ECD |
| **LONG-TERM** | | |
| **D** | Develop community challenge to develop solar PV in residential communities, and work with solar financing and installation companies to develop a prize for participation, e.g., solar PV system for public building. | ECD |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

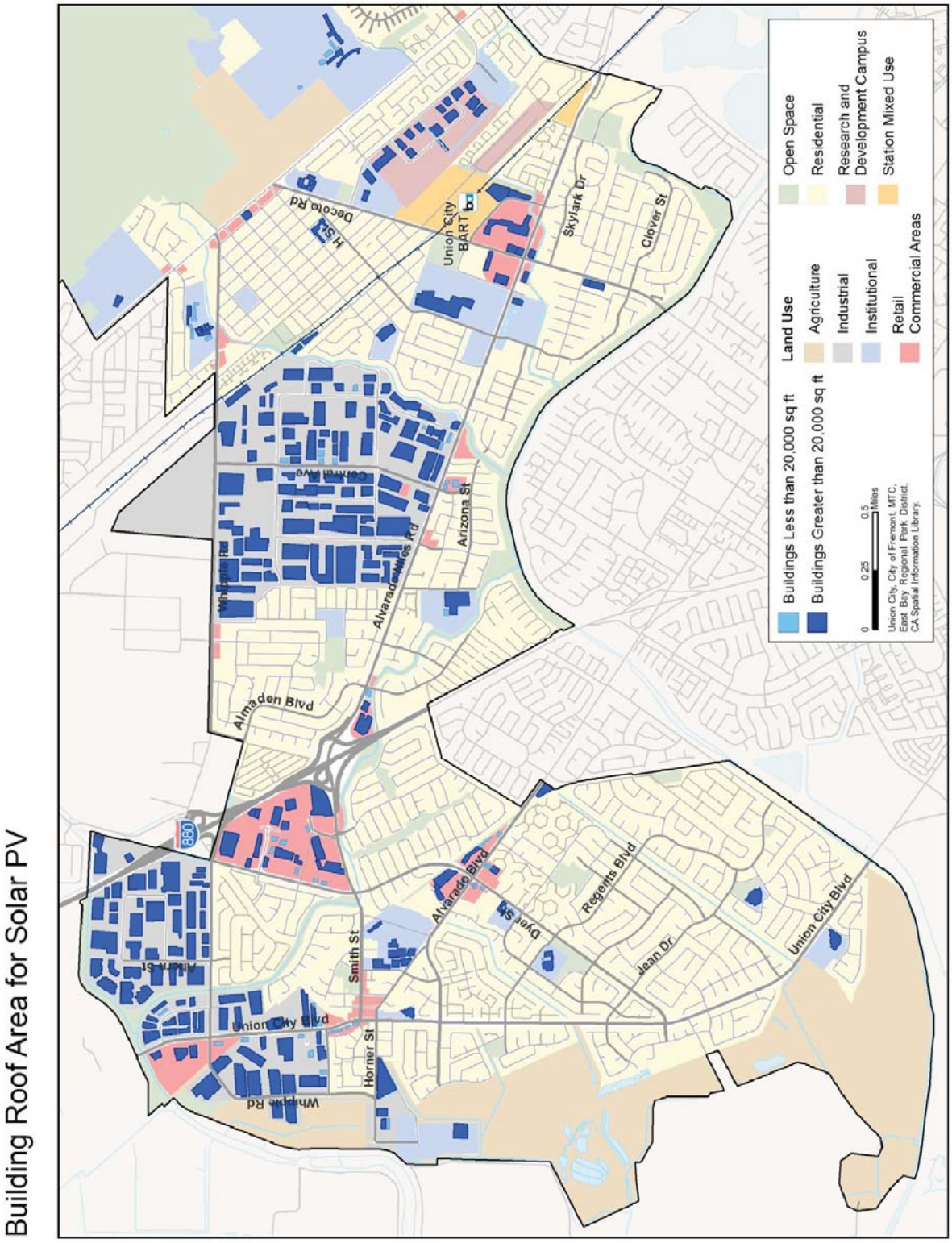
Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A




**Map E-7:** Map of potential for solar PV on commercial rooftops
*Source: Union City General Plan; AECOM.*

# E-8: Wastewater Facility Energy Conservation and Reduction

## Measure E-8.1: Explore opportunities to reduce energy consumption of wastewater facility through methane-to-energy production and solar PV installation.

The City will work with the Union Sanitary District (USD) to explore opportunities to provide a renewable energy supply to meet the energy demand from the wastewater treatment facility. USD is planning on developing renewable energy capacity using two distinct technologies: 1-MW of methane-to-energy capacity; and a 150-kW solar PV system.

### Methane-to-Energy Production

Wastewater must be treated and purified before it can be reintroduced into the environment. Wastewater treatment in USD facilities involves anaerobic digestion where, in the absence of oxygen, bacteria digest residual solids and create methane gas as a byproduct. Methane gas can be converted to significant amounts of energy, with further treatment and can be used as a substitute for natural gas. The treatment plant currently generates limited power from the gas using an internal combustion engine and burns some of this methane gas to provide the heat required for the digestion process. Following the completion of the project, the plant will produce a significant portion of their electricity needs from methane and heat their digesters with the waste heat from the electricity generation process, providing significant energy savings.

### Solar PV

See measure E-7.1 for description of solar PV systems. The USD is planning on installing a 150-kW system as a trial to assess the future viability of solar as a renewable energy source to meet the plant's energy demand.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Support USD in exploring opportunities to supply the energy demand from the wastewater treatment facility through renewable energy generation. Anticipated development of 150-kW of solar PV system. | ECD |
| **MEDIUM-TERM** | | |
| **B** | Work with USD to explore opportunities to supply the energy demand from the wastewater treatment facility through renewable energy generation. Anticipated development of 1-MW of additional energy generation capacity through methane-to-energy. | ECD |

| *Progress Indicators* | |
|---|---|
| Additional renewable energy generation installed capacity. | 1-MW methane-to-energy<br>150-kW of solar PV |

**GHG Reduction Potential**

560 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

N/A

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

*This page was left blank intentionally*

# Waste Reduction

Waste-related GHG emissions result from personal consumption and waste disposal patterns, as well as from pre-consumer commercial and industrial processes. In Union City, 8.8 percent of GHG emissions are associated with solid waste generation and disposal in landfills (31,873 MT $CO_2e$/yr in 2020). Waste disposal creates emissions when organic waste (e.g., food scraps, yard clippings, paper, and wood) is buried in landfills and anaerobic digestion takes place, emitting methane, a potent GHG. GHG emissions are also produced throughout a product's life cycle – through extraction and processing of raw materials, manufacturing processes, and product distribution to consumers.

The City currently contracts with Allied Waste Industries and Tri-CED Community Recycling, Inc. to provide residential waste collection and recycling. The City recognizes that, due to limited remaining landfill space in Northern California, disposing of solid waste will become more expensive. Presently, most waste reduction practices focus on diverting waste products from landfills through recycling. However, it is also important to consider programs that reduce overall waste generation, as well as product and material reuse alternatives.

As consumers of goods and services, we all generate waste and related GHG emissions. Both our choices as consumers and behaviors concerning waste reuse, reduction, and recycling determine our personal contributions to community waste generation. Increasing waste reduction behaviors and altering product purchase decisions can substantially reduce our personal GHG emissions, and in the process reduce community waste generation.

The total GHG reduction potential of the Waste Reduction Action Area is 8,920 MT $CO_2e$/yr, or approximately nine percent of the total GHG reductions of the CAP.

# WR-1: Waste Reduction Policies

## Measure WR-1.1: Increase Waste Diversion Target

Union City will adopt an amendment to its Waste Diversion Resolution to raise the goal for waste reduction and diversion to 90 percent by 2020 (building on Resolution 3367-07, which establishes a goal of 75 percent reduction of waste going to the landfills by 2010, which is in accordance with the County-wide waste reduction goal, also of 75 percent - May 22, 2007). Achieving this aggressive target will require full participation from residents and businesses, and collaboration with Stopwaste.Org, other Bay Area cities, and Alameda County. The City, in partnership with Stopwaste.Org, will prepare Comprehensive Waste Diversion and Reduction Plan that identifies strategies and actions for minimizing waste in the city over the next 10 years.

In the short-term, the City will augment existing waste diversion programs, conduct a variety of outreach programs to increase participation in waste reduction, recycling, and composting programs, and adopt mandatory requirements to ensure achievement of this important goal. The City will implement a phased approach that focuses on education first and enforcement second.

**GHG Reduction Potential**

8,920 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Medium - High

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Medium

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with Stopwaste.Org and other organizations to create a Comprehensive Waste Diversion and Reduction Plan and provide public education regarding strategies and implementation. | City Manager's Office |
| **B** | Develop and adopt a mandatory commercial recycling ordinance. | City Manager's Office |
| **MEDIUM-TERM** | | |
| **C** | Develop a food and green waste collection ordinance that requires all residential and commercial food scraps and food soiled paper to be placed in carts. | City Manager's Office |
| **D** | Develop ordinances to ban use/sales of unrecyclable plastics and disposable bags/containers. | City Manager's Office |
| **E** | Develop and adopt a city-wide "single-use" bag ordinance that requires a consumer fee for single use carry-out shopping bags. | City Manager's Office |
| **F** | Develop an ordinance that requires take-out food containers to be compostable or recyclable within Union City's Recycling and Composting System. | City Manager's Office |

| *Progress Indicators* | |
|---|---|
| Interim Waste Diversion Target at 2015. | 82.5% |
| Waste Diversion Target at 2020. | 90% |

# WR-1: Waste Reduction Policies

## Measure WR-1.2: Strengthen Construction & Demolition Standards

### Current Standards

The City's current Green Building Ordinance stipulates that new residential developments must meet Built It Green's Green Point rated system; new non-residential projects must meet Stopwaste.Org's Alameda County Small Commercial Green Building Checklist; and new City-sponsored projects must achieve a Silver rating in the LEED-rating system. Each of these systems includes either a requirement or option to achieve a waste diversion target. In the Green Point Rated standard, section A.2.a states that a residential project is required to "divert 50 percent (by weight) of All Construction & Demolition Waste". The Small Commercial Green Building Checklist requires that a project "divert 100 percent of concrete and asphalt concrete and divert at least 65 percent of remaining job site construction waste from landfill via recycling or reuse". The LEED-NC rating system contains a credit option within the Materials and Resources section - Credit 2: Construction Waste Management, which awards one point for achieving a 50 percent construction waste diversion rate and two points for 75 percent. The City's Construction and Demolition Debris Recycling Ordinance (Municipal Code Chapter 15.75) also requires demolition and renovation projects, with total costs of $100,000 or more, or residential remodels, which increase building square footage by 50 percent or more, to divert at least 50 percent of all construction and demolition debris generated.

### New Standard

The City will build upon these standards to require a minimum diversion rate of 75 percent for inert construction and demolition waste (e.g., concrete, asphalt, stone) and 50 percent of all remaining designated project-related construction and demolition waste (e.g., wood, vegetative materials, metals) to be recycled or reused by 2015. The increased diversion rate goal will help encourage composting, recycling, or reuse of the "remaining designated" material types.

| | Action | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Adopt an ordinance to require that require 75 percent of all designated project-related construction and demolition debris be recycled or reused by 2015. | City Council<br>ECD |
| **B** | Expand outreach, including promoting waste diversion programs by building owners/managers and contractors. | ECD |
| **MEDIUM-TERM** | | |
| **C** | Work with Stopwaste.Org to develop educational programs for construction professionals about advanced construction and demolition waste diversion techniques. | ECD |
| ***Progress Indicators*** | | |
| | Construction and demolition waste diversion rates for designated project-related debris. | 75% by 2015 |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

Low - Medium

**Savings to Resident or Business**

Medium - High

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Low

# WR-2: Major Waste Generator Outreach

## Measure WR-2.1: Continue to partner with Stopwaste.Org to improve technical assistance and financial support.

To support the City's waste diversion target (WR-1.1), Union City will, in collaboration with State agencies, Stopwaste.Org, and the local waste management services, support the provision of low-cost to free waste audits for major waste generators. These audits will be conducted with the intention of providing a tailored suite of cost-effective waste reduction strategies for major waste generators.

A waste audit is an analysis of a particular building's or business' waste stream. It can identify what types of recyclable materials and waste a business generates, and how much of each type can be recovered for recycling or discarded. Using the data collected during a waste audit, an organization can identify ways to reduce waste, enhance its recycling efforts, and determine the potential for cost savings. Once waste audits have been conducted, an implementation and monitoring program will be established to track the effectiveness of the waste reduction measures.

By designing a more efficient waste disposal program, a business can increase the amount of paper, plastic, and metals that it recycles, which reduces air and water pollution, helps reduce waste-related GHG emissions, conserves natural resources, and saves the business money.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with Stopwaste.Org to promote audits of major waste generators and recommend strategies to reduce waste and increase recycling. | City Manager's Office |
| **B** | Provide training and other assistance, and collaborate with associations, producers, processors, service providers, unions, and others to increase waste diversion. | City Manager's Office |
| **MEDIUM-TERM** | | |
| **C** | Provide support to major waste generators and other organizations to identify financial aid and funding resources to increase waste diversion. | City Manager's Office |
| ***Progress Indicators*** | | |
| Participation rate in free waste audits by major waste generators. | | 50% by 2020 |

# WR-3: Public Outreach

## Measure WR-3.1: Expand outreach programs and establish incentives for waste reduction.

Union City already has an exemplary record of waste reduction and recycling programs for residences, including the following programs:

- 2005 – Implementation of residential curbside single stream recycling.
- 2005 – Residential yard waste collection increased to weekly service.
- 2005 – Implementation of residential food-scrap collection.
- 2006 – Start of annual compost giveaway (2 bags of free compost per household).
- 2006 – Implementation of electronic waste drop-off.
- 2007 – Implementation of household battery and cell phone collection.
- 2008 – Recycling program targets multi-family complexes.
- 2009 – Implementation of commercial food scrap recycling program.
- 2011 (expected) – Mandatory multi-family and commercial recycling ordinance.

To aid the achievement of the 2020 solid waste reduction and diversion goal (WR-1.1), the City will partner with Stopwaste.Org to expand recycling and food waste reduction outreach programs to increase participation. The City will strive to build on the historic participation of these programs – e.g., between 2006 and 2009, the yard waste program achieved an average participation rate of 13 percent with approximately 30 percent of green carts containing food scraps.

### Future Solid Waste and Recycling Franchise Agreements

One potential approach to incorporate waste reduction measures into future solid waste and recycling franchise agreements is through a Pay-as-You-Throw (PYT) Waste Disposal Program, which consists of tiered disposal fees. Communities with PYT programs create a direct economic incentive for residents and businesses to recycle more and to generate less waste. Almost half of all California communities have PYT programs.

| | Action | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Enhance implementation of existing recycling and composting programs through education and outreach. | City Manager's Office |
| **B** | Incorporate waste reduction measures into future solid waste and recycling franchise agreements. | City Manager's Office |
| **MEDIUM-TERM** | | |
| **C** | Explore opportunity to incorporate waste reduction measures into future solid waste and recycling franchise agreements through a PYT Waste Disposal Program. | City Manager's Office |
| **D** | Participate in EPA's WasteWise Communities, which offers technical assistance to promote cost savings and efficiency with waste prevention, recycling, and purchasing recycled content products. | City Manager's Office |
| **E** | Support regional efforts to develop a compost facility in Alameda County. | City Manager's Office |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Low

# WR-3: Public Outreach

## Measure WR-3.2: Identify key sites and events for "Recycle on the Go" Infrastructure and implement program.

According to the US Environmental Protection Agency, 30 to 40 percent of waste is generated outside the home. A 2005 California Integrated Waste Management Board study found that 2.44 lbs of waste/person/day is produced at events, nearly half of which is recyclable cardboard, paper, and plastic. Improving waste recycling and composting at these events represents a low-cost opportunity for the City to support its waste diversion goal.

This issue has already been addressed at the State level, when Governor Schwarzenegger signed AB 2176 (Montanez, Chapter 879, Statutes of 2004) into law targeting mandatory planning for reduction of waste generated at venues and events. The law requires the largest venue facilities and events in each city and county to plan for solid waste reduction and upon request, report information regarding their waste reduction efforts to their local jurisdiction.

Following this direction from the state, the City will explore the potential of introducing recycling programs, known as "Recycle on the Go" programs, in places where large numbers of people gather, such as parks, sporting venues, transportation hubs, special events, and shopping centers. Initially, the City may elect to develop a pilot program in selected event venues to test particular approaches to developing these programs. Appropriate venues may include James Logan High School Stadium, Union Landing, the Intermodal Station District, or any of the many Community Centers or Parks for special events. Once strategies have been established and tested, the City will implement this program in all venues and during all events that attract substantial numbers of visitors, and thus generate large quantities of waste.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Introduce recycling programs in places where large numbers of people gather, such as parks, sporting venues, transportation hubs such as bus and train stations, special events, and shopping centers. Create clear signage and provide oversight of proper use. (Organize Volunteer Corps, school program) | City Manager's Office<br>Public Works |
| ***Progress Indicators*** | | |
| Waste generated at events with "Recycle on the Go" infrastructure. | | Downward Trend |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# WR-4: Environmentally Responsible Purchasing

## Measure WR-4.1: Collaborate with relevant agencies and organizations regionally to urge adoption of legislation that requires extended producer responsibility to improve the recyclability of products and packaging.

The City will continue to work with Stopwaste.Org, Alameda County cities, other Bay Area communities and the California Product Stewardship Council, a non-profit organization dedicated to ensuring producer responsibility, to collectively urge the State and federal governments to pass legislation that requires extended producer responsibility, and improves the recyclability of products and packaging. Such legislation would reduce waste streams to landfills, and greatly reduce lifecycle emissions and other environmental impacts associated with many consumer products.

While the City recognizes the importance of extended producer responsibility legislation to the achievement of the 90 percent diversion rate target (WR-1.1), only emissions reductions stemming from decreased methane production in landfills are included in the quantification of the waste action area's GHG emission reductions. The rationale of this decision is due to the fact that extended producer responsibility would not reduce emissions contained in the City's 2005 baseline inventory.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Continue to work with Stopwaste.Org, Alameda County cities, and other organizations including the California Product Stewardship Council to urge adoption of legislation that requires extended producer responsibility to improve the recyclability of products and packaging. | City Manager's Office<br>ECD |
| ***Progress Indicators*** | | |
| N/A | | N/A |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

GHG Reduction Potential

Supporting

Community Co-Benefits

Cost to City

Low - Medium

Cost to Resident or Business

N/A

Savings to Resident or Business

N/A

# WR-5: Municipal Operations and Procurement Policy

## Measure WR-5.1: Increase waste reduction in municipal facilities and enhance implementation of Environmentally Preferable Purchasing program.

### Municipal Office Operations

According a Lawrence Berkeley National Laboratory study, the average office worker in the US uses 10,000 sheets of copy paper each year, which translates to approximately two pounds of paper products every day. Though this estimate is likely to be high for Union City, the City can still reduce paper and paper-based product waste generation through an enhanced recycling program.

The City will conduct an inventory of all municipal operations generating waste and adopt a policy to go paperless whenever feasible. This measure will help the City to lead by example by reducing municipal waste generation, while also help reduce municipal operations and maintenance costs.

### Environmentally Preferable Purchasing Policy

The City has adopted Stopwaste.Org's Environmentally Preferable Purchasing Guidelines when making procurement decisions. However, one obstacle in fully implementing this program is the initial cost differential between a standard product and an environmentally preferable product (EPP). Though many EPPs have beneficial environmental attributes such as better energy of water efficiency, non-toxicity, or lower life-cycle carbon emissions, they can be prohibitively expensive compared to standard products. Thus, to ensure better implementation of this program, the City will explore potential revisions to the budget allocation process to account for price differential of EPPs.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | The City will conduct an inventory of all municipal operations generating waste and adopt a policy to go paperless whenever feasible. | City Manager's Office<br>Green Action Team |
| **B** | Expand implementation of the City's existing Environmentally Preferable Purchasing Policy, which addresses the areas of recycled content, recyclability, energy and water efficiency, and toxicity. | City Manager's Office<br>Green Action Team |
| **MEDIUM-TERM** | | |
| **C** | Explore potential revisions to the budget allocation process to adequately fund the Environmentally Preferable Purchasing Program. | City Manager's Office |

| *Progress Indicators* | |
|---|---|
| Percentage of EPP products purchased by the City. | Upward Trend |
| Volume of paper purchased annually. | Downward Trend |
| Recycling to waste ratio. | Upward Trend |

# Water Conservation

Energy is required to pump, transport, and treat potable water and wastewater, as well as heat and cool it. Emissions from this energy usage accounted for about two percent of the GHG inventory in 2020 (7,176 MT $CO_2$e/yr). With water supplies expected to continue declining over the coming decades, water conservation strategies have the double benefit of reducing GHG emissions and aligning demand with future water availability. GHG emission reductions in the water sector are, in great part, driven by a state-level policy, SB 7. This policy requires a reduction in per capita water consumption by 2020 - either the "standard target", a 20 percent reduction from the average water demand between 1994 and 2004, or the "alternative minimum", a five percent reduction from the average water demand between 2003 and 2007. The Alameda County Water District (ACWD) has yet to determine the specific SB 7 target that it will attempt to achieve, and, therefore, there is uncertainty in developing guidelines for ACWD's compliance. However, for the purposes of the CAP, it was assumed that the "standard target" was chosen, which translates into approximately a 13 percent reduction below 2005 levels due to the fact that the average water demand between 1994 and 2004 is seven percent less than the water demand in 2005.

The strategies proposed in this section are a combination of voluntary programs and ordinances. Given that there are simple, cost-effective water conservation strategies that residents and businesses can implement, the City is anticipating high voluntary participation to help reduce water use. However, it may be necessary to develop some mandatory measures, such as a Water Conservation Ordinance (see the Optional Measures section), if the SB 7 target seems out of reach through voluntary measures.

The total GHG reduction capacity of the Water Conservation Action Area is 880 MT $CO_2$e/yr, or approximately one percent of the total reductions achieved by the CAP.

**GHG Reduction Potential**

290 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low-Medium

**Cost to Resident or Business**

Low-Medium

**Savings to Resident or Business**

High

# WC-1 Water Conservation Policies

## Measure WC-1.1: Water Efficient Landscape Ordinance

Landscape irrigation is one of the largest uses of potable water in Union City. Designing landscapes to favor low-water demand plants adapted to the local climate is one of the most cost effective measures for reducing potable water use. To complement plant selection, installing smart irrigation controllers that adjust irrigation in response to weather and soil moisture conditions can further reduce water use.

Important supporting measures (see Measure WC-2.1) such as conducting irrigation reviews to help consumers identify inefficiencies in their irrigation habits and landscape characteristics are also recommended. Consistent with the Updated Model Water Efficient Landscape Ordinance AB 1881 requirements, the Union City Water Efficient Landscape Ordinance (listed in Chapter 18.112 of the Municipal Code) requires the following for both public and private landscaping:

- Low water plant choices
- Grouping compatible plants into hydrozones
- Irrigation water budgets
- Use of efficient irrigation systems, including sensors and automatic controllers
- Soil assessment and soil management
- Post-installation inspection and maintenance
- Preparation of landscape documentation packages
- Limited exemptions

Additionally, the City's Landscape Ordinance stipulates that public and private projects must adhere to the Bay Friendly Landscaping Guidelines.

The City's Landscape Ordinance provides guidance for water efficient landscape design, but does not specify a water efficiency improvement. The City shall amend the existing ordinance to add a specific water efficiency reduction target of 50 percent beyond the initial requirements for plant installation and establishment. This provision will be applicable to all of the new landscape projects above 2,500 square feet or larger or are associated with new construction within the city (the same as currently indicated). However, a significant challenge in reducing overall landscape water use is to effectively target smaller new landscapes and existing landscapes that do not currently comply with AB 1881 requirements. The City should follow the supporting measures listed in WC 2.1 in order to address these areas.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Amend Water Efficient Landscape Ordinance to require new landscape projects that are 2,500 square feet or larger or are associated with new construction to reduce water consumption by 50% beyond the initial requirements for plant installation and establishment | ECD |
| ***Progress Indicators*** | | |
| Amend Water Efficient Landscape Ordinance. | | 2012 |

# WC-1 Water Conservation Policies

## Measure WC-1.2: Indoor and Outdoor Non-potable Water Systems Program

Reuse of graywater and rainwater on-site is an effective strategy for reducing water demand. These systems collect water from buildings and landscapes and then reuse it in other indoor and outdoor applications that do not require water quality beyond a basic level of treatment. Graywater is composed of all non-toilet wastewater generated in a typical household from bathtubs, showers, bathroom sinks and washing machines. Rainwater can also be captured and used in the same fashion as graywater. With minimal treatment, rainwater and graywater can be reused inside for toilet flushing and washing machines (and outside for drip irrigation). This measure establishes a program to promote indoor and outdoor reuse through graywater and rainwater systems.

Since this measure is not widely used in building and landscape construction currently, it will require the promotion of new approaches to building plumbing. However, following SB 1258, which directs the Department of Housing and Community Development to develop a more wide-ranging set of standards for residential graywater systems for both indoor and outdoor uses, there are no additional policy changes necessary in order for the City to proceed with a program to promote the use of graywater and rainwater within buildings. The program may include education on approved systems that follow current building code, technical assistance on installation and maintenance, or support for demonstration projects.

| Action | | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Develop an Indoor Non-potable Water Systems Program to encourage use of low-water indoor systems (i.e., toilets) that use graywater or rainwater in residential and commercial buildings. | ECD |
| **B** | In collaboration with ACWD, provide educational materials on the use of indoor recycled water systems. | ECD |
| **C** | In collaboration with ACWD, explore the potential for demonstration projects that show the use of indoor recycled water systems. | ECD |
| **D** | Develop an Outdoor Non-potable Water Systems Program to encourage use of rainwater collection systems for outdoor irrigation and watering for residential and commercial landscapes. | ECD |

### *Progress Indicators*

| | |
|---|---|
| Percentage of buildings that incorporate a non-potable water system for indoor use. | 10% |
| Percentage of buildings that incorporate a rainwater collection system for outdoor use. | 30% |

**GHG Reduction Potential**

240 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Low-Medium

**Cost to Resident or Business**

Medium-High

**Savings to Resident or Business**

Low-Medium

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Very Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Low

# WC-1 Water Conservation Policies

## Measure WC-1.3: Work with Alameda County Water District to consider "Conservation Pricing" or full-cost pricing of water

Water rate policies can be used to encourage water conservation. Price signals are a strong policy tool to create the appropriate system of incentives and disincentives to achieve higher levels of water conservation. However, pricing must also be set to provide adequate revenues to operate local utilities (ACWD) in a fiscally sound manner.

Conservation pricing is an approach to designing a rate structure system that takes into account the full cost of water provision. The way in which these rate structures are designed varies across jurisdictions, and some utilities even employ a combination of rate structures. The City will support ACWD in exploring various rate structures to achieve higher levels of water conservation, which could potentially include some of the following:

- *Flat rate:* based on class structure generally reflects the average commodity costs.
- *Inverted block rate:* charges more as the consumption increases encourages conservation, but may not provide revenue stability for the utility if not combined with other rates.
- *Seasonal rates:* charges more when water is less plentiful.
- *Drought provisions:* go into effect when there is a water shortage.

Sending the right price signal to water consumers can be used to modify customer behavior to use less water at the tap, stop/prevent leakage and waste, and send less wastewater for treatment. While this measure may result in significant costs to some users, especially industrial uses with high water needs, a conservation pricing structure can provide a tangible reward for users who implement water conservation measures. Another benefit of this approach is that this system encourages broad participation, whereas voluntary or more specific policies may only impact a narrow group of users.

| Action | | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Work with ACWD to consider conservation pricing. Some types of conservation pricing are: repeal of volume discounts; inverted block rates; seasonal rates; and excess use charges. | ECD<br>ACWD |

### *Progress Indicators*

| | |
|---|---|
| Conservation Pricing Program implementation. | 2013 |

# WC-2 Public Outreach and Consumer Education Programs

## Measure WC-2.1: Work with Alameda County Water District to expand outreach programs and incentivize water conservation throughout Union City

The Alameda County Water District currently provides a range of incentive programs to encourage water conservation, which include programs that are targeted to residential homeowners; commercial, industrial, and institutional building managers; large landscapes; and general public education campaigns. This measure is targeted at increasing participation in existing programs, and extending certain incentives to further reduce water consumption in Union City. The following actions are designed to raise awareness and facilitate the adoption of water-saving practices and installation of water-conserving technologies. Additionally, many of these actions are necessary in order to achieve the expected GHG reductions identified in WC-1.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Work with ACWD to offer water efficiency training for irrigation designers and installers. | ECD<br>ACWD |
| **B** | Work with ACWD to increase uptake of their existing water conservation tips, free audits and rebates for low water appliances to residents and businesses. | ECD<br>ACWD |
| **C** | Work with ACWD and Stopwaste.Org to promote implementation of the Bay Friendly Landscape Guidelines for existing residential and commercial landscapes within the City. | ECD<br>ACWD |
| **D** | Promote availability of water-efficient and climate-appropriate plants at local nurseries and home improvement stores. | ECD |
| **MEDIUM-TERM** | | |
| **E** | Work with the ACWD to redesign the water bill format to encourage water conservation in residential and commercial users. | ECD<br>ACWD |
| **F** | Work with ACWD to extend audit and water conservation incentives. Provide Water Efficiency Audit Programs for commercial buildings. | ECD<br>ACWD |
| **G** | Work with ACWD to develop additional commercial rebate programs: For instance, rebates for water efficient equipment such as retrofitting cooling towers, and replacing water-cooled with air-cooled equipment. | ECD<br>ACWD |
| ***Progress Indicators*** | | |
| Percentage of buildings that utilize incentive programs in order to fund water conservation measures that achieve, on average, a 20 percent reduction in water consumption. | | 25% |

**GHG Reduction Potential**

350 MT $CO_2e$/year

**Community Co-Benefits**

**Cost to City**

Medium-High

**Cost to Resident or Business**

Low - Medium

**Savings to Resident or Business**

Low - Medium

# WC-2 Public Outreach and Consumer Education Programs

## Measure WC-2.2: Become a member in existing water conservation and outreach programs

Membership in national and regional conservation and outreach programs is a simple step to achieve broader adoption conservation practices with relatively little effort. As with many non-location specific programs, specific local water use opportunities and constraints must be considered to ensure optimal benefits of these programs in Union City.

### EPA WaterSense

WaterSense is a partnership sponsored by the EPA to promote water-efficient products and practices. Membership benefits include strengthening water-efficiency outreach efforts, reducing market research costs, and obtaining access to customizable free tools and resources to promote water efficiency and conservation.

### Ahwahnee Water Principles for Resources-Efficient Land Use

The City can utilize these land use principles as an effective blueprint for reducing costs and sustaining the reliability and quality of future water resources. According to the Local Government Commission, there are nine community principles and five implementation principles that "many cities and counties are already using to improve the vitality and prosperity of their communities." (The Union City General Plan contains a related policy.)

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Become a partner in EPA's WaterSense program: WaterSense is a partnership sponsored by the EPA to promote water-efficient products and practices. | ECD |
| **LONG-TERM** | | |
| **B** | Adopt resolution for the Ahwahnee Water Principles for Resource-Efficient Land Use: The City can utilize these land use principles as an effective blueprint for reducing costs and sustaining the reliability and quality of future water resources. | ECD |

#### *Progress Indicators*

| | |
|---|---|
| Membership in EPA's WaterSense program.<br>Adopt resolution for the Ahwahnee Water Principles. | 2013 |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Very Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# WC-3 Innovation

## Measure WC-3.1: Identify potential demonstration projects for low-impact development practices

Low Impact Development (LID) is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective impervious areas to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product. There are many methods to realize these principles, such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.

Often one of the biggest barriers to innovation within the private land development sector is the lack of built examples of new techniques and technologies, and aversion to being the inventor of new approaches. By facilitating the development of exemplary or demonstration projects that can achieve adequate environmental and financial performance, the City can confirm the feasibility of LID practices in Union City, and promote more widespread adoption of these practices. These demonstration projects also can serve as an education tool and template for landowners, developers, and residents to follow.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Provide educational materials and guidance to homeowners that wish to build rain gardens. | ECD |
| **MEDIUM-TERM** | | |
| **B** | In coordination with City agencies, identify potential demonstration projects for low-impact development (LID) practices, such as rain gardens, bio-swales, bio-retention facilities, and green roofs. | ECD<br>Public Works |
| **C** | Work with Alameda County Water District to develop water-sensitive urban design guidelines for new construction and retrofit of existing urban environment. | ECD<br>ACWD |

### *Progress Indicators*

| | |
|---|---|
| Number of LID demonstration projects completed by 2015: | |
| Rain gardens | two |
| Bio-swales | two |
| Bio-retention facilities | two |
| Green roofs | two |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low-Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

**GHG Reduction Potential**

Non-Quantifiable

**Community Co-Benefits**

**Cost to City**

Low-Medium

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# WC-4 Municipal Water Conservation

## Measure WC-4.1: Implement water conservation programs in City-operated facilities

As the City is interested in setting an example for local residents and businesses through municipal actions, Union City will endeavor to achieve higher levels of water conservation in municipal facilities. The City will use a water audit to identify the most cost-effective water conservation solutions, which could include stopping and preventing leaks in piping, installation or conversion to water conserving fixtures, recycling of graywater, collecting and using rainwater, and installing water meters.

According to the Whole Building Design Guidelines, leaks within a building plumbing system may account for 10 percent or more of total water pumped. The City can solve this problem simply with regular maintenance. In terms of water efficiency, low-flow fixtures are readily available, with comparable costs to standard fixtures and easy installation. Other measures may include increasing pipe insulation or installing recirculating units to reduce both water and energy consumption. Finally, installing water meters would allow the City to set water reduction goals with a means to measure conservation success.

Landscapes also consume a large quantity of water in municipal facilities. Though new projects must meet the most recent minimum Bay Friendly Landscape Scorecard points, there may be opportunities to implement water conservation measures in existing landscapes. Bay Friendly Landscaping and Gardening, a program run through Stopwaste.Org, is a holistic approach to gardening and landscaping that works in harmony with the natural conditions of the San Francisco Bay Watershed. Bay-Friendly practices foster soil health, conserve water and other valuable resources while reducing waste and preventing pollution. See WC-1.1 for more information on water efficient landscape practices.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Using the ACWD Water Use Efficiency Survey Program, assess water consumption in City-operated facilities and implement programs for efficient water use and wastewater reuse. Utilize available rebates for water-efficient appliances and fixtures. | ECD<br>Public Works |
| **MEDIUM-TERM** | | |
| **B** | Implement water conservation programs in City-operated facilities (efficiency and wastewater reuse) as defined by state law and develop new measures in response to community input and changing technology; pursue adaptive management. | ECD<br>Public Works |

| *Progress Indicators* | |
|---|---|
| Percentage reduction in water use by City-operated facilities. | Aim for ~20% reduction (in line with SB 7) |

# Green Infrastructure

Green infrastructure consists of a wide variety of natural features that, when integrated within an urban environment, provide valuable ecosystem services to the community. In Union City, green infrastructure includes the urban forest (street trees and park trees), natural stormwater-absorbing landscapes, and community gardens. Green infrastructure benefits the City by reducing urban heat island effects, reducing building energy use, improving stormwater and waste management, and benefiting public health through improved air quality. The measures contained within this action area describe green infrastructure improvements capable of reducing GHG emissions or removing and storing carbon from the atmosphere by physical and biological processes such as plant photosynthesis (a process known as carbon sequestration).

The City recognizes green infrastructure, such as trees and natural areas, is a valuable asset. Apart from the valuable ecosystem services that they provide, they also beautify neighborhoods, increase property values, reduce noise, create privacy, and establish habitat for bird species.

Community gardens are plots of land that offer residents a place to grow edible crops and ornamental flowers. Currently, Union City contains one City-operated community garden located at Venito Avenue in the Seven Hills development. This garden increases residents' access to fresh produce, preserves urban green space, promotes intergenerational and intercultural interaction, and provides an alternative form of recreation. Many additional potential community garden sites exist within the City.

The total GHG emission reductions potential of the Green Infrastructure Action area is 1,600 MT $CO_2e$.

**GHG Reduction Potential**

1,600 MT $CO_2e$

**Community Co-Benefits**

**Cost to City**

Medium - High

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

Very Low

# GI-1: Carbon Sequestration

## Measure GI-1.1: Expand the urban forest to sequester carbon and reduce building energy consumption

The City will expand on the existing street tree program through the development of a Community Tree Program that will provide design, planting, and maintenance guidelines for expanding planting efforts, as well as coordinating implementation between departments and relevant utilities. An important component of the management plan will be a public tree inventory and canopy coverage analysis that examines existing urban forest conditions and identifies priority management areas. The public tree inventory will be updated annually and used to monitor tree health and evaluate the carbon sequestration potential of the urban forests. The Community Tree Program will also provide expanded public outreach and education regarding the benefits of the urban forest.

The Community Tree Program will set a goal of planting 5,000 new public trees by 2020 (500 net trees added per year). On public rights-of-way, the City will require planting of tree species that are known to be low-maintenance (compatible with hardscape), and provide high levels of sequestration and building energy reduction benefits. In addition to reducing GHG emissions and capturing and storing carbon, expanding the City's urban forest will produce a wide range of community benefits and improve residents' quality of life.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Conduct a public tree inventory and canopy coverage analysis to determine best opportunities to improve the urban forest. | Public Works |
| **B** | Develop a cost-effective list of climate-appropriate trees for maximizing shade and carbon sequestration (e.g., using CUFR Carbon Calculator) and high-albedo (above Solar Reflectance Index of 29) paving materials for all non-permeable surfaces for easy access by residents and businesses (not applicable to streets). | Public Works |
| **MEDIUM-TERM** | | |
| **C** | Develop a Community Tree Program with a goal to help qualifying neighborhoods increase their canopy cover to 40 percent or higher. | Public Works |
| **D** | Promote shade tree planting on private property to achieve planting of 100 shade trees a year. For example, promote shade tree planting event on Arbor Day (March 7-14 in CA). | ECD<br>Public Works |
| **LONG-TERM** | | |
| **E** | Work with nurseries to find funding and provide financial incentives for tree planting. | Public Works |

### *Progress Indicators*

| | |
|---|---|
| Total number of trees added by 2020 (net of tree planting and tree removal). | 5,000 trees |

# GI-1: Carbon Sequestration

## Measure GI-1.2: Expand or restore natural habitat areas in the city, where possible.

The Society for Ecological Restoration defines ecological restoration as an "intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity, and sustainability." The City will explore opportunities to expand or restore natural habitat areas. To initiate this process, the City will sponsor a rapid ecological assessment of opportunities for preservation of valuable ecological resources or restoration of degraded ecosystems. Rapid Ecological Assessment (REA) is a methodology developed by The Nature Conservancy to provide comprehensive and reliable information about biodiversity resources in situations where time and financial resources are limited. Based on these findings, the City will develop an implementation plan to maximize the potential for ecological restoration and preservation within the city limits, both for private and municipal projects.

In addition, the City will include ecological restoration or preservation as a goal in project development for municipal projects. To the extent feasible, municipal projects that include a landscape component should utilize native plants, grasses, and trees, or other climate-adapted plants and/or be designed consistent with Bay-Friendly landscaping principles. In addition, the City should employ techniques such as erosion control, reforestation, removal of non-native species and weeds, revegetation of disturbed areas, daylighting streams, as well as habitat restoration for targeted species.

| | Action | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | For projects in the City, include ecological restoration or preservation as a goal in the project development. To the extent feasible, utilize native plants, grasses, and trees, other climate-adapted plants and/or be designed consistent with Bay-Friendly landscaping principles in projects that include a landscape component. | ECD<br>Public Works |
| **MEDIUM-TERM** | | |
| **B** | Conduct a rapid ecological assessment of opportunities for preservation of valuable ecological resources or restoration of degraded ecosystems. Based on these findings, develop an implementation plan to maximize the potential for onsite ecological restoration and preservation for municipal projects. | ECD<br>Public Works |
| ***Progress Indicators*** | | |
| | Rapid Ecological Assessment. | Conducted by 2013 |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Very Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# GI-1: Carbon Sequestration

## Measure GI-1.3: Include carbon sequestration as an objective within City-led natural area restoration projects.

Flood Control District lands (Union City is located in Zone 5 of the Alameda County Flood Control and Water Conservation District), recreational trails, and creeks offer important opportunities for ecosystem restoration in the City. While protecting water quality, enhancing biological habitat value, and providing flood control should remain the primary purposes of restoration projects, these projects can also sequester considerable amounts of carbon. Using Climate Action Registry protocols, the City will actively evaluate the carbon-sequestration potential of City-led restoration projects. Restoration of riparian forests (i.e., forested area of land adjacent to a body of water such as a river, stream, pond, lake, marshland, estuary, canal, playa, or reservoir) on Flood Control District land may be a prime opportunity for carbon sequestration. Building on the rapid ecological assessment conducted as part of GI-1.2, the City will maintain its high standard for acquiring and protecting urban green and open space to promote functional forest ecosystems with high potential to sequester carbon dioxide.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Maintain the City's high standard for acquiring and protecting urban green and open space to promote functional forest ecosystems with high potential to sequester carbon dioxide. | ECD<br>Public Works |

# GI-2: Community Gardens and Agriculture

## Measure GI-2.1: Continue and expand the existing local community garden program to increase local food security and provide local recreation amenities.

Community gardens are plots of land located in urban, suburban, or rural neighborhoods that offer residents a place to grow edible crops and ornamental flowers. The gardens increase community members' access to fresh produce, preserve urban green space, promote inter-generational and intercultural interaction, and provide an alternative form of recreation. Many potential community garden sites exist within the Union City.

The Union City Community Garden, the sole community garden that the City currently operates, is located at Venito Avenue in the Seven Hills development off Mission Boulevard. As of 2010, it consisted of 17 plots, each measuring approximately 15 feet by 30 feet. The annual fees are $50 for a plot including water and $20 for compost, sand and horse manure. There is an additional community garden located on Mission Boulevard near the Decoto neighborhood that is not affiliated with the City.

The City will work to increase the number of community gardens available to residents. Successful community gardens require defined management policies and high levels of community involvement. The City will create a program to establish and manage community gardens throughout the City. The program will identify potential sites for community gardens and develop gardens in selected locations. The City will focus on locating gardens near residential populations with an interest in urban food production. Both public and private land (in partnership with property owners) will be considered. The City will provide basic infrastructure required for community gardening and develop garden rules and management policies.

| Action | | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Conduct an inventory to identify land within Union City with potential to convert to community gardens and/or urban farms. | Leisure Services |
| **B** | Work with local NGOs to provide education and incentives for organic and sustainable food production, including: greenhouses and food preservation and food processing facilities within neighborhood centers to increase capacity for local food processing, storage, and distribution. | Leisure Services |
| ***Progress Indicators*** | | |
| Number of community gardens and/or amount of land dedicated to community gardens. | | Upward trend |

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low - Medium

**Cost to Resident or Business**

Low

**Savings to Resident or Business**

N/A

**GHG Reduction Potential**

Supporting

**Community Co-Benefits**

**Cost to City**

Low

**Cost to Resident or Business**

N/A

**Savings to Resident or Business**

N/A

# GI-3: Municipal Leadership in Innovation

## Measure GI-3.1: Identify educational demonstration projects for Bay Friendly Landscaping Projects.

Stopwaste.Org's Bay-Friendly Landscaping and Gardening Guidelines are a holistic approach to gardening and landscaping that works in harmony with the natural conditions of the San Francisco Bay Watershed. Bay-Friendly practices foster soil health, conserve water, and other valuable resources while reducing waste and preventing pollution.

The Bay-Friendly Gardening Program offers the home gardener tools for creating a beautiful and healthy Bay-Friendly garden. Likewise, the Bay-Friendly Landscaping Program provides resources for the professional landscaper to design, construct, and maintain Bay-Friendly landscapes for clients.

The City, in coordination with Stopwaste.Org, will explore opportunities for implementing demonstration projects that will educate citizens and businesses of the benefits of employing Bay Friendly Landscaping and Gardening techniques in their landscapes. Demonstration projects will be developed on a variety of landscapes such as lawns, ornamental gardens, vegetable gardens, xeriscapes, and wooded lots, to represent the diversity of landscaping options available to residents and businesses.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | In coordination Stopwaste.Org, Identify educational demonstration projects for Bay Friendly Landscaping Projects. Implement projects on a variety of landscape types, such as lawns, streetscapes, ornamental gardens, vegetable gardens, xeriscapes, and wooded lots. | Public Works |
| **B** | Organize Stopwaste.Org-led educational programs that demonstrate the benefits of Bay Friendly Landscaping using the demonstration projects. | ECD<br>Public Works |
| ***Progress Indicators*** | | |
| Demonstration projects that illustrate Bay Friendly Landscaping and Gardening principles. | | One per landscape type by 2015 |

# Community Engagement

## Community Engagement and Participation Opportunities

Community participation is essential to successful implementation of the CAP. The City is developing a comprehensive outreach and involvement strategy to ensure the community can find out about what GHG reduction efforts the City is undertaking, as well as how to participate in different initiatives that the City is implementing. This section provides an outline for this strategy by summarizing the measures and actions that indicate public outreach as a key component of implementation, naming potential partners, and identifying specific outreach strategies for parts of the community. Effective public participation will increase the likelihood that the GHG reduction measures recommended in this plan achieve estimated participation rates. Higher participation rates can be achieved if the outreach and education programs are adapted over time to meet the changing needs of the community.

## Measures and Actions

The majority of the GHG reduction measures include an engagement component and require public participation to be successful. To streamline these many efforts, measures (and their associated actions) that include some public outreach component are listed in Tables CE-1 through CE-4, and organized according to the likely target audience, or specific outreach strategy.

## Specific Outreach Strategy

To consolidate outreach efforts, the City is developing specific outreach strategies to bundle communication efforts for specific parts of the community. These strategies are categorized into three target groups:

- Households
- Businesses
- Groups

## Partners

Many of the measures identify specific organizations, businesses, or agencies as partners for implementation and communication, which include the following:

- Metropolitan Transportation Commission (MTC)
- Association of Bay Area Governments (ABAG)
- Pacific Gas & Electric (PG&E)
- Alameda County Water District (ACWD)
- Union Sanitary District (USD)
- Tri-CED Community Recycling
- TransForm
- Alameda County Transit (AC Transit)
- Stopwaste.Org
- East Bay Bicycle Coalition
- Build It Green
- California ReLeaf
- Slow Food
- Sustainable Agriculture Education (SAGE)
- Union City Transit Management Authority (UCTMA)
- United States Green Building Council (USGBC)

## Households

Many measures and actions are directly applicable to implementation in Union City's households. Communication and materials can easily be consolidated for several of the actions. For example, communication about energy efficiency, waste reduction, and water conservation efforts can be customized directly for this target audience.

### Table CE-1 Summary of Public Outreach Mea

| Measure & Actions | | Partners |
|---|---|---|
| **T-3.2** | **Enhance rideshare infrastructure to facilitate community participation.** | |
| **A** | Work with UCTMA and ACCMA to encourage employers to create rideshare databases for their employees and employees of adjacent businesses. | UCTMA, ACCMA, Businesses |
| **E-1.1** | **Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to residential uses.** | |
| **A** | Work with ABAG, PG&E, and other organizations to develop and implement Energy Upgrade California program for residential property owners. | ABAG, PG&E, and other organizations |
| **B** | Leverage Energy Upgrade California outreach and educational materials to encourage energy efficiency retrofits and the use of energy efficient, low-carbon, or renewable technologies. | Energy Upgrade California |
| **C** | Promote in-home conservation strategies as outlined by PG&E, California Flex Your Power, and other industry sources. | PG&E, CA Flex Your Power |
| **E** | Facilitate the use of energy efficient demonstration homes as an education and promotion tool. | Built-it-Green, US Green Building Council – Northern California |
| **E-2.1** | **Work with PG&E to promote existing household appliance upgrades.** | |
| **A** | Leverage Energy Upgrade California platform to promote Energy Star appliances and electronics. | Energy Upgrade California, PG&E |
| **E-3.2** | **Promote 'Cool Roofs' to mitigate the urban heat island effect and reduce air conditioning use** | |
| **A** | Promote cool roof technology through education and outreach, targeted to the community through materials and resources available on the City website, as well as complimentary materials available at City-sponsored and other public events. | Lawrence Berkeley National Laboratory Urban Heat Island Group, Build it Green |
| **E-5.1** | **Work with PG&E and other cities in Alameda County to accelerate Smart Grid integration in existing and new buildings.** | |
| **B** | Develop an outreach program with PG&E that informs property owners and businesses about smart grid and smart appliance technologies, as well as energy conservation opportunities | PG&E, Alameda Cities |

| | | |
|---|---|---|
| | using smart meter technology. | |
| **E-6.1** | **Develop program to facilitate the installation of solar hot water heaters in existing and new residential development.** | |
| **A** | Work with PG&E and California Solar Initiative to develop an outreach program to maximize renewable energy systems and specifically installation of solar hot water systems in residential buildings. | California Solar Initiative, US EPA, PG&E |
| **B** | Encourage the use of California Solar Initiative, US EPA, PG&E, and other rebates for solar hot water heaters. | California Solar Initiative, US EPA, PG&E |
| **E-7.3** | **Develop a "Solar Cities" style public outreach and education platform to promote renewable energy systems for homes and businesses.** | |
| **A** | Develop a Solar Cities -style program that features educational workshops, web resources, and targeted information to assist property owners in making decisions about investing in a photovoltaic solar system. | Solar companies as appropriate, SolarCitiesNow.com, the cities of Fremont, Newark, and Hayward |
| **B** | In collaboration with California Solar Initiative, develop workshops for the public. The purpose of the workshops is to educate consumers about solar energy systems, the incentive and rebate programs, and provide them with an opportunity to meet professionals working in the industry. | California Solar Initiative |
| **D** | Develop community challenge to develop solar PV in residential communities, and work with solar financing and installation companies to develop a prize for participation, e.g. solar PV system for public building. | Solar financing and installation companies |
| **WC-1.2** | **Indoor and Outdoor Non-potable Water Systems Program.** | |
| **A** | Develop an Indoor Non-potable Water Systems Program to encourage use of low-water indoor systems (i.e., toilets) that use graywater or rainwater in residential and commercial buildings. | Local plumbing companies, ACWD |
| **D** | Develop an Outdoor Non-potable Water Systems Program to encourage use of rainwater collection systems for outdoor irrigation and watering for residential and commercial landscapes. | Local landscaping companies, ACWD |
| **WC-2.2** | **Become a member in existing water conservation and outreach programs.** | |
| **A** | Become a partner in EPA's WaterSense program: WaterSense is a partnership sponsored by the EPA to promote water-efficient products and practices. | EPA |
| **WC-3.1** | **Identify potential demonstration projects for low-impact development practices** | |
| **C** | Provide educational materials and guidance to homeowners that wish to build rain gardens. | Stopwaste.Org, ACWD |
| **D** | Participate in EPA's WasteWise Communities, which offers technical assistance to promote cost savings and efficiency with waste prevention, recycling, and purchasing recycled content products. | EPA |
| **WR-3.1** | **Expand outreach programs and establish incentives for waste reduction.** | |

| | | |
|---|---|---|
| A | Enhance implementation of existing recycling and composting programs through education and outreach. | Stopwaste.Org, Tri-CED Community Recycling |
| D | Participate in EPA's WasteWise Communities, which offers technical assistance to promote cost savings and efficiency with waste prevention, recycling, and purchasing recycled content products. | EPA |
| **WR-3.2** | **Identify key sites/events for "Recycle on The Go" Infrastructure and implement program.** | |
| A | Introduce recycling programs in places where large numbers of people gather, such as parks, sporting venues, transportation hubs such as bus and train stations, special events, and shopping centers. Create clear signage and provide oversight of proper use. (Organize Volunteer Corps, school program) | Event organizers, New Haven Unified School District |
| **GI-1.1** | **Expand the urban forest (e.g., street trees and trees on private lots) in order to sequester carbon and reduce building energy consumption.** | |
| C | Develop a Community Tree Program with a goal to help qualifying neighborhoods increase their canopy cover to 40 percent or higher. | California Releaf |
| D | Promote shade tree planting on private property to achieve planting of 100 shade trees a year. For example, promote shade tree planting event on Arbor Day (March 7-14 in CA). | California Releaf |

*Notes: The codes tie these measures back to the different action areas. E=Energy; GI = Green Infrastructure; LU= Land Use; T= Transportation; WC=Water Conservation; WR=Waste Reduction;*

## Businesses

Several measures and actions create opportunities for partnerships with local businesses and employers and for consolidating communication efforts. For example, promoting bicycle riding in collaboration with local bicycle retailers can provide win-win marketing opportunities and targeted communication options. This outreach strategy also lists communication efforts targeted at local businesses.

### Table CE-2 Summary of Public Outreach Measures - Businesses

| Measure & Actions | | Partners |
|---|---|---|
| **T-3.1** | **Increase participation by employers in transportation demand management programs.** | Union City Employers |
| **T-3.2** | **Work with UCTMA and ACCMA to encourage employers to create rideshare databases for their employees and employees of adjacent businesses.** | ACCMA, Businesses |
| **E-3.1** | **Develop a comprehensive energy efficiency program that** | |

| | | |
|---|---|---|
| | **provides outreach, financing, and other forms of assistance to commercial and industrial building owners.** | |
| **B** | Leverage Energy Upgrade California outreach and educational materials to encourage energy efficiency retrofits and the use of energy efficient, low-carbon, or renewable technologies. | Commercial and industrial building owners |
| **E-5.1** | **Work with PG&E and other Alameda County Cities to accelerate Smart grid integration in existing and new buildings.** | |
| **B** | Develop an outreach program with PG&E that informs property owners and businesses about smart grid and smart appliance technologies, as well as energy conservation opportunities using smart meter technology. | PG&E, Alameda County cities |
| **E-7.2** | **Develop a comprehensive renewable energy program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners.** | |
| **B** | Work with ABAG to develop and implement the Energy Upgrade California program, which will provide access to financing for non-residential renewable energy systems. | Commercial and industrial building owners, ABAG |
| **WC-2.1** | **Work with Alameda County Water District to expand outreach programs and incentivize water conservation throughout Union City** | |
| **F** | Work with ACWD to provide audit and water conservation incentives. Provide Water Efficiency Audit Programs for commercial buildings. | ACWD |
| **G** | Work with ACWD to develop additional commercial rebate programs: For instance, rebates for water efficient equipment such as retrofitting cooling towers, and replacing water-cooled with air-cooled equipment. | ACWD |
| **WR-1.1** | **Increase Waste Diversion Target** | |
| **D** | Develop ordinances to ban use/sales of unrecyclable plastics and disposable bags/containers. | Stopwaste.Org |
| **E** | Develop and adopt a city-wide "single-use" bag ordinance that requires a consumer fee for single use carry-out shopping bags. | Stopwaste.Org |
| **F** | Develop an ordinance that requires take-out food containers to be compostable or recyclable within Union City's Recycling and Composting System. | Stopwaste.Org |
| **WR-1.2** | **Strengthen Construction and Demolition Ordinance (C&D) to require 75% of construction and demolition debris to be recycled or reused.** | |
| **B** | Expand outreach, including promoting participation in waste diversion programs by building owners/managers and contractors. | Building owners/managers and contractors |
| **C** | Work with Stopwaste.Org to develop educational programs for construction professionals about advanced construction and demolition waste diversion techniques. | Stopwaste.Org, construction professionals |
| **GI-1.1** | **Expand the urban forest to sequester carbon and reduce building energy consumption** | |
| **E** | Work with nurseries to find funding and provide financial incentives for tree planting. | Local nurseries, National Arbor Day Foundation |

## Groups

Several measures involve close collaboration with particular groups within the community. These include schools, organizations and public agencies. For example, outreach and education campaigns pertaining to various water conservation measures can be combined into one comprehensive campaign – with information on water conservation opportunities, technologies, incentives, technical assistance, etc. – and targeted to specific audiences, such as home owners' associations or neighborhoods.

### Table CE-3 Summary of Public Outreach Measures - Groups

| Measure & Actions | | Partners |
|---|---|---|
| **T-1.2** | **Work with New Haven Unified School District to maximize participation in Safe-Routes-to-School programs.** | New Haven Unified School District |
| **A** | Work with New Haven Unified School District to pursue additional Safe-Routes-to-School grants and funding. | New Haven Unified School District |
| **E-7.2** | **Develop a comprehensive renewable energy program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners.** | |
| | Explore opportunities in the New Haven Unified School District for solar PV demonstration installations. | New Haven Unified School District, solar installation companies |
| **WC-1.3 A** | Work with ACWD to consider conservation pricing or full-cost pricing of water. Some types of conservation pricing are: repeal of volume discounts; increasing block rates; seasonal rates; and excess use charges. | ACWD |
| **WC-2.1** | Work with ACWD to expand outreach programs and incentivize water conservation throughout Union City. | ACWD |
| **A** | Work with ACWD to offer water efficiency training for irrigation designers and installers. | ACWD |
| **E** | Work with ACWD to redesign the water bill format to encourage water conservation in residential and commercial. | ACWD |
| **WC-3.1** | **Identify potential demonstration projects for low-impact development (LID) practices.** | City Agencies, ACWD, The Watershed Project |
| **B** | In coordination with City agencies, identify potential demonstration projects for low-impact development (LID) practices, such as rain gardens, bio-swales, bio-retention facilities, and green roofs. | City Agencies |
| **C** | Work with Alameda County Water District to develop water-sensitive urban design guidelines for new construction and retrofit of existing urban environment. | ACWD, The Watershed Project |
| **WR-1.1 A** | Work with Stopwaste.Org and other organizations to create a Comprehensive Waste Diversion and Reduction Plan and provide public education regarding strategies and implementation. | Stopwaste.Org |
| **WR-4.1** | **Collaborate with relevant agencies and organizations regionally to urge adoption of legislation that requires** | Stopwaste.Org, Alameda County cities, California Product |

| | | |
|---|---|---|
| | **extended producer responsibility to improve the recyclability of products and packaging.** | Stewardship Council |
| **A** | Continue to work with Stopwaste.Org, Alameda County cities, and other organizations including the California Product Stewardship Council to urge adoption of legislation that requires extended producer responsibility to improve the recyclability of products and packaging. | Stopwaste.Org, Alameda County cities, California Product Stewardship Council |
| **GI-2.1** | **Continue and expand the existing local community garden program to increase local food security and provide local recreation amenities.** | |
| **C** | Work with local non-governmental organizations (NGOs) to provide education and incentives for organic and sustainable food production, including: greenhouses, food preservation and food processing facilities within neighborhood centers to increase capacity for local food processing, storage, and distribution. | Local NGOs, food producers, preservation and processing facilities in neighborhood centers, Slow Food East Bay |
| **GI-3.1** | **Identify educational demonstration projects for Bay Friendly Landscaping Projects.** | |
| **A** | In coordination with City agencies and Stopwaste.Org, Identify educational demonstration projects for Bay Friendly Landscaping Projects. Implement projects on a variety of landscape types, such as lawns, ornamental gardens, vegetable gardens, xeriscapes, and wooded lots. | City agencies, Stopwaste.Org, The Watershed Project |

# Climate Adaptation

## Introduction to Climate Adaptation

Although rising awareness and concern regarding potential climate change impacts has led to many policy responses and programs aimed at reducing GHG emissions, Union City shares the view that we are highly likely to have to learn to live with or adapt to a changed climate. While GHG mitigation initiatives are important to long term climate stabilization, scientists warn of the time it takes for the climate system to respond to GHG reductions. Regardless of future emissions, the GHG concentrations already in the atmosphere commit us to a likely range of climate change impacts in the near future.

Climate adaptation measures are taken to adjust to or co-exist with actual or expected climate change. Some of the possible effects of climate change in Union City include: increased frequency of extreme weather events such as heat waves and storms, increased variability of precipitation causing both flood and drought situations, and rising sea levels. These effects could have a significant impact on property, public health and safety. This chapter outlines some climate adaptation strategies that Union City should consider.

## Increasing Frequency of Extreme Weather Events

### *Flash flooding*

Flash flooding has serious impacts on public health, transportation infrastructure, and power service and can result in severe property damage. Even small flooding events have been known to cause public transportation disruptions. Power outages due to storm damage can compound transport delays and put populations dependent on electricity for health needs at-risk. Deaths, injuries, and destruction of property due to storm damage or flash flooding are also a significant risk in these events. Stormwater events, although providing water inflows, are also a main case of toxin infiltration.

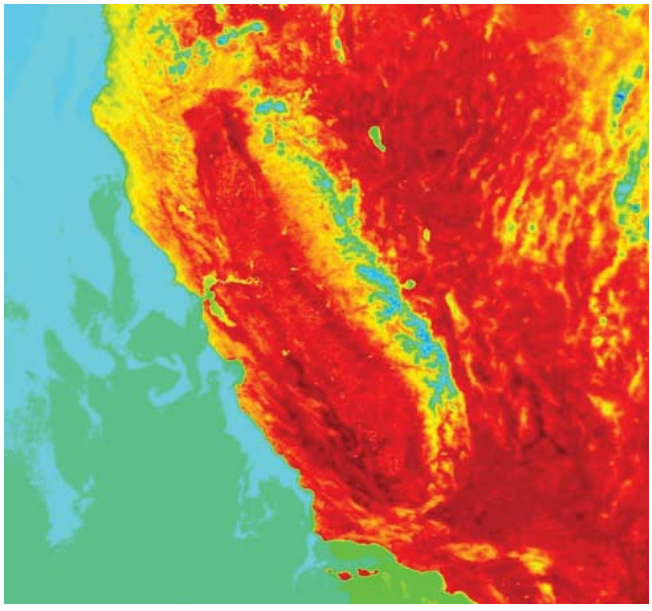
Storm events around Union City may be mitigated by the Salt Ponds restoration project, which will restore wetlands around the Bay Area. Tidal wetlands absorb floodwaters during storm events and slowly release runoff into the Bay. As a result, they increase the resiliency of the adjacent area in times of significant precipitation. Of particular relevant to Union City is that this project will include wetland restoration at the Eden Landing Ponds, the area between Alameda Creek and the San Mateo Bridge which acts as a buffer between Union City and the Bay.

### *Heat waves*

The most significant risk of heat waves is the likely increased levels of heat stress and death caused by extreme temperatures. This is of particular concern for the elderly and infirm, as well as those with heart or respiratory problems and perhaps mental health issues. The percentage of Union City residents over the age of 65 increased from 8.1 percent of the population in 2000 to 11.7 percent in 2008, suggesting an increasing percentage of elderly residents in the city.

With the prevalence of air-conditioner use during heat waves, demand for power may outstrip supply and cause a power blackout. This risk is compounded during a heat wave, particularly for those managing their heat stress with air-conditioning. If the outage is sufficient to disrupt public transportation, mass stranding of passengers may also occur.

The California Climate Action Team projects that temperatures in California will rise between 1.8 F and 5.4 F by mid century and 3.6 F and 9 F by the end of the century. Temperature increases in the lower range of warming are projected to be similar to the difference in average annual temperature between Monterey and Salinas. In the upper range of projected warming, the temperature



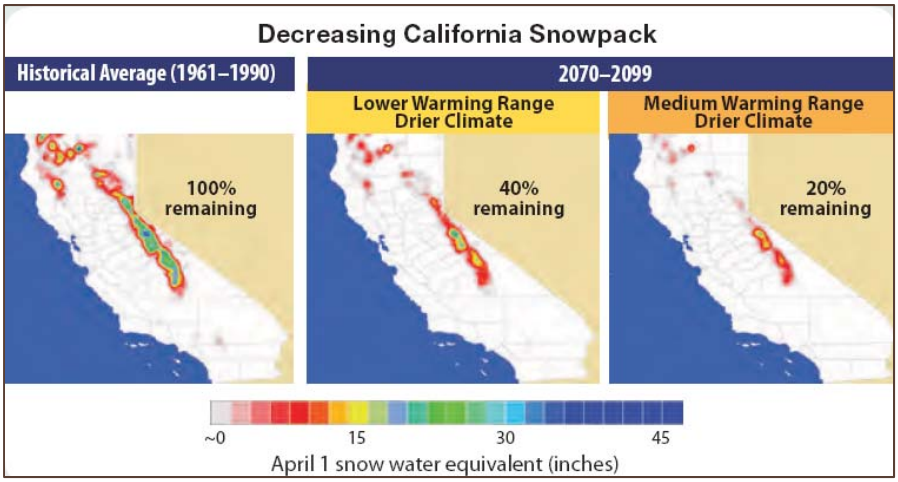
*Extreme summer temperatures in the Bay Area.*
*Source: NASA Climate Change Center*

difference would be closer to that between San Francisco and San Jose. Coastal cities like Union City may experience a larger proportional increase in summer heat compared to inland cities, according to the San Francisco Bay Conservation Development Commission.

## Increasing Variability of Precipitation

### *Drought*

The Sierra snowpack provides as much as 65 percent of California's water supply by accumulating snow during our wet winters and releasing it slowly during our dry springs and summers. Warmer temperatures will cause smaller snow packs to melt faster and earlier, making it more difficult to store and use. By 2050, scientists project a loss of at least 25 percent of the Sierra snowpack. Some research suggests a loss of 70 percent by 2080. This loss of snowpack means less water will be available for Californians to use. Climate change is also expected to result in more variable weather patterns throughout California. More variability can lead to longer and more severe droughts. SB 7, referenced in Chapter 1 as well as in the Water Conservation Action Area, is already anticipating this change through requiring a significant reduction in urban water consumption by 2020.




*Decreasing California Snowpack. Source: Our Changing Climate: Assessing the Risks to California.*

The most significant and inherent risk in drought is insufficient water supply. While it is a positive sign that many Bay Area residents are aware of the scarcity of potable water and have made significant reductions in consumption in recent times, this may also mean the 'low hanging fruit' of water savings have been addressed and, with an increasing population, further savings may be challenging.

### *Wildfires*

*California wildfires. Source: California Climate Action*

The combination of increasing risks of both drought and heat waves leads to a considerably greater probability of wildfires. The costs of these fires may be significant. According to AIR Worldwide, the 1991 Oakland Hills Fire caused an estimated three billion dollars in damages. In less than half a day, it scorched 1,600 acres and destroyed 2,900 homes. Fire conditions were aggravated by extreme winds and the fact that the East Bay had experienced approximately five years of drought. Actions are currently being undertaken in the East Bay to respond to the threat of wildfires. In 2004, the City of Oakland established a Wildfire Prevention Assessment District to raise funds for vegetation management, property owner chipping services, fire prevention education and training, and roving fire patrols. In April 2010, the East Bay Regional Park District Board approved a Wildfire Hazard Reduction and Resource Management Plan.

## Rising Sea Levels

### Sea-level rise around Union City

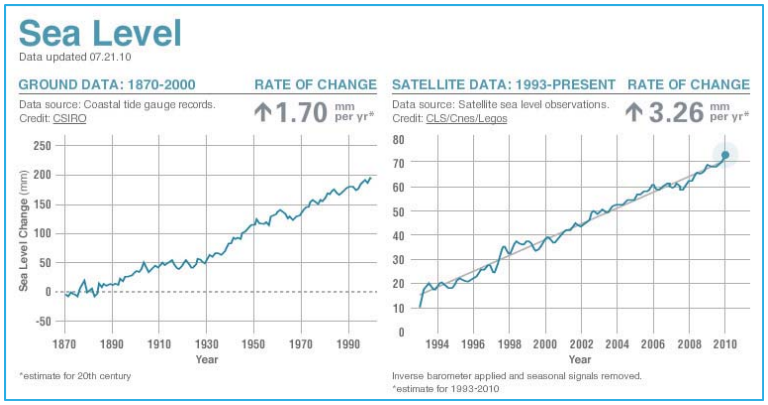
*Areas affected by 16 inch sea-level rise*

*Areas affected by 55 inch sea-level rise*

*Source: Bay Conservation Development Commission*

Even the most conservative studies show sea levels have already risen throughout the San Francisco Bay, mostly due to thermal expansion. Adaptation to sea-level rise is somewhat unique in that often the best and most cost-effective adaptation measures are related to urban planning or infrastructure. A long-term strategy to address sea-level rise is far more cost-effective and integrated than potentially drastic and urgent measures undertaken much later when shores or piers are inundated. The Governor's Delta Vision Blue Ribbon Task Force has recommended that California plan for a scenario of 16 inches of sea-level rise by 2050, and 55 inches by 2100 (California Resources Agency 2008).

The Hayward Area Shoreline Planning Agency has already undertaken a preliminary study of the effect of sea-level rise along the Hayward Shoreline. Of particular relevance to Union City is the fact that even though Union City is not directly adjacent to the Bay, some infrastructure elements on which the city depends are Bay-adjacent. These include wastewater pipelines and electricity transmission lines.




*Global seal level rise. Source: NASA Global Climate Change Center*

## Climate Adaptation Strategies

The effects of climate change will be cascading, and build in magnitude as time passes. However, there are a range of strategies that begin to address the new and different conditions that climate change will bring to Union City. These strategies address not only the immediate effects of climate change on built and natural environments, but also the risks to public health and safety these effects pose. While no means all-inclusive, the list of strategies below provides a useful starting point for Union City to begin to adapt to new meteorological and environmental realities.

Many adaption strategies also have positive mitigation effects, or vice-versa. Where Union City GHG reduction measures have adaptation potential, these measures been noted in italics below.

### Potential Strategies for Water and Wastewater

- Encourage the application of Low Impact Development (LID), which ease flood peak flows. For example, require projects to capture and manage a specific amount of rainwater per storm through onsite infiltration, retention, and bio filtration. *Measure WC-3.1*
- Expand water recycling and develop local water supplies that won't be affected by climate change. One example of this is storm water harvesting, which can assist in both controlling flash flooding events and serve as a water supply. *Measures WC-1.1, WC-1.2, WC-3.1, GI-1.2.*

*Low impact development. Source: Low Impact Development Center*

- Determine the resiliency of existing storm water and waste water collection systems to extreme flooding and storm surges.
- Implement all best management practices for water use efficiency, in order to reduce water demand, wastewater discharges, and energy demand. Efficient water use can help Union City cope with water shortages, thus reducing their economic and environmental impacts. *Measures WC-1.1, WC-1.2, WC-2.1, WC-2.2, WC-4.1.*

### Potential Strategies for Buildings and Energy

- Improve building envelopes and encourage the application of green roof or cool roof technology, to reduce the need to cool buildings in hot weather. *Measure E-1.1, E-3.1, E-3.2, E-4.1.*
- Ensure street trees are able to grow and thrive. This may mean evaluating existing requirements and maintenance schedules, increasing space available for roots to grow, and decreasing soil compaction and over paving. *Measure GI-1.1.*

*Building construction. Source: Union City.*

- Encourage energy conservation, implement energy efficiency strategies and facilitate renewable energy installation to reduce pressure on the electrical grid during heat waves and drought conditions. *Measures E-1.1, E-1.2, E3.1, E-4.1, E-5.1, E-6.1, E-7.1, E-7.2, E-8.1.*

### Potential Strategies for Public Health

- Reduce urban heat island effect through cool roof technology, consideration of cool roadway materials, and addition of shade trees in parking lots and sidewalk, and creation of additional green space throughout the city. *Measures E-3.2, GI-1.1, GI-1.2.*
- Consider mapping neighborhoods that could be vulnerable to the effects of climate change, including sea-level rise, flooding, fire, and the urban heat island effect. Include considerations of housing quality and transportation access to best target public health outreach. In a city the size of Union City it is likely that demography, rather than geography, will be most important factor in identifying the areas that need outreach the most.
- Union City's fire departments should evaluate and plan for an increased risk of larger and more frequent wildfires.

### Potential Strategies for Sea-Level Rise

- The next update to the General Plan should consider that significant new development, including infrastructure and buildings, should not be sited in areas that are significantly at risk in a future anticipating sea-level rise or wildfire.
- The next update to the Green Building Ordinance should consider including a requirement for new development to demonstrate that it will either be unaffected by sea-level rise (predicted within a certain time period) or can adapt to sea-level rise before being sited or permitted.
- Work with the Bay Conservation Development Commission, Alameda County, Hayward Area Shoreline Planning Agency, and neighboring cities to identify areas that will be affected by sea-level rise and protect shoreline, through shoreline realignment, levee or sea wall construction, gradual steepening, or diffuse armoring, where appropriate.

# Optional Measures

## OPTIONAL MEASURES

The following measures were considered for inclusion in the CAP, but were not selected per the direction given by the City Council. However, they may be considered for implementation in the future. The policies, as represented below, contain a variety of key policy and program design considerations. If any of these policies were to be implemented in the future, the specifics of the program design would have to be reviewed and possibly refined. Furthermore, the estimated GHG emission reductions and associated economic analyses should be considered preliminary, and would have to be adjusted based on the final program design details, implementation date, and participation assumptions. The City will not take credit for the GHG emission reductions associated with these optional measures, without first revising these calculations. For more information on the GHG emission reduction calculations and the economic analyses, refer to Appendix B and C, respectively.

### *Optional Measure 1*: Amend Green Building Ordinance to include an energy performance standard for major additions and remodels.

#### *Current Energy Efficiency Standards for Residences*

The current energy efficiency standards for residential buildings are established through the Green Building Ordinance. The City's current Green Building Ordinance stipulates that new residential developments must meet Build It Green's Green Point rated system; non-residential projects must meet Stopwaste.Org's Alameda County Small Commercial Green Building Checklist; and City-sponsored projects must achieve a Silver rating in the LEED-rating system. However, the Green Building Ordinance does not contain an energy efficiency standard for major additions or remodels.

#### *Energy Efficiency Standards for Major Remodels and Additions*

The City shall amend the Green Building Ordinance to require a 15 percent improvement in energy efficiency for major additions and remodels (above $75,000 in value). Undertaking a major addition or remodel is an opportune time to make energy efficiency improvements that can have long-lasting impacts on the comfort and operational costs of a home. This is due to the fact that most major additions or remodels often involve replacement or significant alterations of walls and roofs, windows, heating and cooling systems, ductwork, lighting, and/or appliances that can all have a big impact on a typical home's energy use. Implementing energy conservation measures such as improving sealing ducts and adding insulation can be achieved cost-effectively.

The City can leverage the prescriptive list of energy conservation measures that will be developed as part of the RECO, as well as the Energy Upgrade CA educational materials, to establish a prescriptive list of cost-effective energy conservation measures that homeowners can implement to meet this standard.

| | Action | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Amend Green Building Ordinance to require a 15 percent energy efficiency improvement for major additions and remodels (>=$75,000 in total project cost). | ECD |
| **MEDIUM-TERM** | | |
| **B** | Establish a prescriptive package of energy conservation measures. | ECD |

***Preliminary Estimate of GHG Emission Reductions:*** 620-1,240 MT $CO_2e$/yr

### *Optional Measure 2: Require all new non-residential construction to achieve California Green Building Code Tier I Energy Efficiency Standards (Section A5.203.1.1).*

The City's current Green Building Ordinance stipulates that new residential projects must meet Build It Green's Green Point rated system; new non-residential projects must meet Stopwaste.Org's Alameda County Small Commercial Green Building Checklist; and new City-sponsored projects must achieve a Silver rating in the US Green Building Council's LEED-rating system. Each of these systems includes a requirement to achieve a specified energy efficiency benchmark. In the Green Point Rated standard, section J.1.a states that a residential project is required to "exceed Title 24 standards by a minimum of 15 percent". The Small Commercial Green Building Checklist requires that a project "exceed Title 24 standards by a minimum of 10 percent." The LEED-New Construction rating system contains a requirement within the Energy and Atmosphere section - EA Credit 1: Optimize Energy Performance, which offers two compliance pathways: Option 1 - Whole Building Energy Simulation or Option 2 - Prescriptive Compliance Path. Option 1 requires a minimum building energy performance of 12 percent better than ASHRAE Standard 90.1-2007, whereas Option 2 offers a prescriptive list of energy conservation measures, but no hard performance target.

California Energy Code requirements (Title 24, Part 6, 2008) serve as the basis for mandatory building energy efficiency standards. The California Green Building Standards (CalGreen), effective in 2011, provides the City with the option of adopting an energy efficiency standard that surpasses the State's basic requirements. The GBC outlines two options: Tier I requires a building's energy performance to exceed Title 24 requirements by 15 percent, while Tier II increases this standard to 30 percent. In the current Green Building Ordinance, only residential buildings would be held to the Tier I standard.

The standard will be performance-based, allowing the builder to achieve enhanced efficiency through the incorporation of a variety of building practices and materials. Increasing the energy efficiency of new residential and commercial buildings should not only reduce energy consumption in the community, but could considerably reduce homeowner and business energy bills.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Amend the City's Green Building Ordinance to incorporate the Tier I energy efficiency standards contained in Section A5.203.1.1 of the 2010 California Green Building Code for all development. | ECD |
| ***Progress Indicators*** | | |
| Green Building Standard ordinance amendment. | | Completed by TBD |

***Preliminary Estimate of GHG Emission Reductions***: 220-440 MT $CO_2e$/yr

### *Optional Measure 3*: Adopt a Residential Energy Conservation Ordinance (RECO) to require energy efficiency retrofits for point-of-sale and major renovations.

Union City will develop and implement a Residential Energy Conservation Ordinance (RECO), a policy tool that requires energy and water efficiency upgrades in existing housing prior to the transfer of ownership. The intent of the RECO is to (a) reduce the community's GHG emissions, (b) reduce tenants' and homeowners' utility bills, (c) reduce the community's susceptibility to energy price fluctuations, (d) improve comfort and livability of homes by reducing drafts and heat imbalances, and (e) preserve the region's valuable water resources.

The RECO will require building owners to implement specific energy and water efficiency measures to achieve a 25 percent energy efficiency improvement. The entry-level package would include duct sealing, attic insulation, programmable thermostats, water heater insulation, hot water pipe insulation, and draft elimination.

Based on average residential property turnover (2000-2010), approximately 30 percent of the city's residential units may be sold to new owners between 2010 and 2020. The total cost of such improvements would be approximately $7,500 to $10,000 dollars for the average single-family home (as of 2009). The RECO will contain a cost ceiling of 3 percent of the sale price or assessed value, not to exceed $30,000. The expense of the required improvements is expected to be absorbed into the building's purchase price and the mortgage, and is usually a minimal expense for the home buyer. Additionally, financing options described in Measure E-1.1 would reduce this up-front cost to homeowners.

| Action | | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Adopt a Residential Energy Conservation Ordinance requiring point-of-sale energy efficiency upgrades. | City Council<br>ECD |
| **B** | Continue consulting with Stopwaste.Org to develop a package of required efficiency improvements that achieves a 25% improvement in the average home. | ECD |
| **C** | Continue working with Stopwaste.Org and other area organizations to develop a list of qualified energy and water efficiency contractors and auditors that could help homeowners comply with the ordinance. | ECD |
| ***Progress Indicators*** | | |
| Percentage of RECO-improved residential homes and units. | | 20-35% of residential homes and units by 2020 |

***Preliminary Estimate of GHG Emission Reductions:*** 3,990-6,980 MT $CO_2e$/yr

### *Optional Measure 4: Adopt a Commercial Energy Conservation Ordinance (CECO) to require energy efficiency retrofits for point-of-sale and major renovations.*

Union City will develop and implement a Commercial Energy Conservation Ordinance (CECO) that ensures that commercial buildings receive energy and water efficiency upgrades prior to the point-of-sale. The intent of the CECO is to (a) reduce building owners' or tenants' utility bills, (b) reduce the community's GHG emissions, and (c) reduce the businesses' susceptibility to energy price fluctuations.

Due to the diversity of commercial building types and a desire to provide owners with maximum flexibility, specific efficiency improvement requirements are not defined. The CECO will require improvements that result in a 25 percent increase in building energy efficiency. Prior to the transfer of ownership, building owners will be required to conduct an energy audit to determine the applicability, costs, and benefits of various energy conservation improvements related to a building's HVAC, furnaces, boilers, lighting, and building envelope. Exemptions will be provided for newer construction or upgraded buildings, as these buildings will likely already have a higher energy efficiency than older buildings. The ordinance would not apply to industrial uses or process-related energy and water demand.

Due to the variety of commercial building, estimation of improvement costs is hard to generalize. The average cost for efficiency upgrades is estimated to be between $1.00 and $3.00 per square foot. The CECO will contain a cost ceiling of two percent of the sale price or assessed value, not to exceed $100,000. The expense of the required improvements is expected to be absorbed into the building's purchase price and the mortgage. See Measure E-3.1 for additional financing options.

| Action | | Responsibility |
|---|---|---|
| **MEDIUM-TERM** | | |
| **A** | Adopt a Commercial Energy Conservation Ordinance requiring point-of-sale energy efficiency upgrades. | ECD |
| **B** | Create a verification program to ensure that the required efficiency upgrade package achieves at least 25% improvement in average commercial building. | ECD |
| **C** | Continue working with Stopwaste.Org and other area organizations to develop a list of qualified energy and water efficiency contractors and auditors that could help building owners comply with the ordinance. | ECD |
| ***Progress Indicators*** | | |
| Percentage of CECO-improved buildings. | | 20-40% of buildings by 2020 |

***Preliminary Estimate of GHG Emission Reductions:*** 6,570-13,140 MT $CO_2e$/yr

### *Optional Measure 5: Residential Water Conservation Ordinance*

Union City will develop and implement a Residential Water Conservation Ordinance (RWCO), a policy tool that requires water efficiency upgrades in existing housing prior to the transfer of ownership. The intent of the RWCO is to (a) reduce the community's GHG emissions; (b) reduce tenants' and homeowners' water utility bills; (c) reduce the community's susceptibility to water rate fluctuations; and (d) preserve the region's valuable water resources.

The City's Green Building and Ordinance stipulates that new residential and commercial buildings must adhere to Build-it-Green's GreenPoint Rated Residential Checklist and the Alameda County Small Commercial Green Building Checklist, respectively. However, there are no specific standards in place for water efficient landscapes for existing buildings and landscapes. The RWCO will set a minimum 20 percent improvement in water efficiency for buildings at point of sale.

There are a range of rebates are available to consumers who purchase water efficient fixtures including those offered by the Alameda County Water District Rebate Programs and Union Sanitary District. See Chapter 4 for more information on available rebate programs, and Appendix C for applicable funding sources.

| Action | | Responsibility |
|---|---|---|
| **SHORT-TERM** | | |
| **A** | Adopt a Residential Water Conservation Ordinance which would require that plumbing fixtures and fixture-fittings achieve a 20 percent improvement in water efficiency above the California Building Code for residential remodels/renovations or at point-of sale. | ECD |

#### *Progress Indicators*

| | |
|---|---|
| Percentage of buildings that meet indoor water efficiency requirement. | 20-35% by 2020 |

***Preliminary Estimate of GHG Emission Reductions***: 220-380 MT $CO_2e$/yr

# Chapter 4: Implementation

## Introduction

Union City recognizes that climate change is one of the most critical challenges facing the world today. The CAP provides vision and guidance for the City's climate protection efforts. To achieve the GHG emissions reduction targets, the City will need to translate this vision into concrete change. This chapter describes how the City will implement the GHG reduction measures and CAP as a whole. The chapter contains the following four sections:

- *Measure Implementation:* Describes how City staff will implement CAP measures and the related actions, and the role of the progress indicators, timetables, and other guidance provided within the measure implementation matrices.
- *Plan Evaluation and Evolution:* Discusses the need to evaluate, update, and amend the CAP over time, in order to ensure that the plan remains effective and current.
- *Relationship to the California Environmental Quality Act (CEQA):* Describes the relationship between the CAP and CEQA, and establishes criteria for staff to use when determining if a proposed development project is consistent with the CAP.

- *Funding Strategies and Financing Mechanisms:* Describes funding strategies, sources, and mechanisms available to implement CAP measures and actions. Potential future financing structures and tools are also identified that can aid the City in both implementing community CAP measures, and government operations CAP programs and projects.

## Measure Implementation

Ensuring that the measures translate from policy language into on-the-ground results is critical to the success of the CAP. To facilitate this, each measure described in Chapter 3 contains a table that identifies the specific actions the City will carry out. The table also identifies responsible departments and establishes an implementation schedule for each action.

The second section of each table provides progress indicators and performance targets that enable City staff, City Council, and the public to track measure implementation and monitor the overall CAP progress. The tables provide both interim and final progress indicators where possible. Interim progress indicators are especially important, as they provide mid-course checks to evaluate if a measure is on the right path to achieving its GHG reductions. See Table 4-1 for a summary of the progress indicators, sector applicability, and voluntary/mandatory enforcement mechanism for each GHG reduction measure.

Upon adoption of the CAP, the identified City departments will become responsible for implementing assigned actions. Key staff in each department will facilitate and oversee action implementation. In order to assess the status of City efforts, CAP implementation meetings will occur every three to six months. Some actions will require inter-departmental or inter-agency cooperation and appropriate partnerships will need to be established accordingly.

**Table 4-1: Summary of Climate Action Plan Progress Indicators**

| Measure | GHG Emissions Reduction | Progress Indicators | | Sector Applicability | Mandatory or Voluntary |
|---|---|---|---|---|---|
| **LAND USE ACTION AREA** | | | | | |
| **LU-1.1:** Continue supporting transit-oriented development in the Intermodal Station District and adjacent areas. | 6,810 MT $CO_2e$/yr | Number of residential units developed within the Intermodal Station District, or within ½ mile of the District. | 1,784 by 2020 | New and Existing Development | Mandatory |
| | | Number of jobs to be located within the Intermodal Station District, or within ½ mile of the District. | 3,000 by 2020 | | |
| **LU-2.1:** Enhance existing neighborhood-serving commercial centers in the City. | 260 MT $CO_2e$/yr | Number of commercial areas converted to pedestrian-oriented mixed-use neighborhood-serving centers. | 3 by 2020 | New and Existing Development | Mandatory |
| | | Number of residential units developed within pedestrian-oriented, mixed-use neighborhood-serving centers. | 230 by 2020 | | |

## Table 4-1: Summary of Climate Action Plan Progress Indicators *Continued*

| Measure | GHG Emissions Reduction | Progress Indicators | | Sector Applicability | Mandatory or Voluntary |
|---|---|---|---|---|---|
| **TRANSPORTATION ACTION AREA** | | | | | |
| **T-1.1:** Continue build-out (goal of 25% build-out), to the extent feasible, of the Pedestrian and Bicycle Master Plan by 2020. | 700 MT $CO_2e$/yr | 2020 bicycle-to-work mode share. | 2.0% (from 0.5% in 2006) | Public | Mandatory |
| | | 2020 walk-to-work mode share. | 3.5% (from 1.3% in 2006) | | |
| **T-2.1:** Provide transit priority and express routes on the Alvarado-Niles and Whipple corridors. | 80 MT $CO_2e$/yr | Additional transit trips on Route 1A, 1B, and 2 per year in 2020. | 110,000 additional riders | Public | Voluntary |
| | | Reduction in VMT from the Route 1A, 1B, and 2 transit improvements in 2020. | 175,000 vehicle miles per year | | |
| **T-2.2:** Convert bus fleet to compressed natural gas or hybrid vehicles. | 270 MT $CO_2e$/yr | Percent of UC Transit vehicles fuel by compressed natural gas or hybrid vehicles. | 100% by 2020 | Public | Mandatory |
| **T-3.1:** Increase participation by employers in transportation demand management programs. | 540 MT $CO_2e$/yr | Reduction in single-occupancy automobile commute trips.<br>*Single-occupancy vehicle data can be obtained through MTC.* | 10% reduction to reach 63% by 2020 (from current level of 73%) | New or Existing Development | Voluntary |
| **BUILDINGS AND ENERGY ACTION AREA** | | | | | |
| **E-1.1:** Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to homeowners. | 2,120 MT $CO_2e$/yr | Percentage of residential buildings that have implemented an energy efficiency retrofit (see Appendices B & D for more details on energy conservation measures and analysis). | 15% of existing residential by 2020 | Existing Development | Voluntary |
| **E-2.1:** Work with PG&E to promote existing household appliance upgrades. | 2,200 MT $CO_2e$/yr | Percentage of approved rebate application for Energy Star appliances. | Percentage of Buildings<br>Refrigerators: 10%<br>Dishwashers: 10%<br>Clothes Washers: 10%<br>Light Bulbs (CFLs): 50% | Existing Development | Voluntary |
| **E-3.1:** Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | 1,450 MT $CO_2e$/yr | Percentage of buildings that have implemented an energy efficiency retrofit (see Appendix B &D for more details on energy conservation measures and analysis). | 15% of existing commercial and industrial buildings by 2020 | Existing Development | Voluntary |

## Table 4-1: Summary of Climate Action Plan Progress Indicators *Continued*

| Measure | GHG Emissions Reduction | Progress Indicators | | Sector Applicability | Mandatory or Voluntary |
|---|---|---|---|---|---|
| **E-3.2:** Promote 'Cool Roofs'. | 4,510 MT $CO_2e$/yr | Square feet of building roof space (and percentage) that has been converted to a "cool roof". Only commercial and retail buildings with cooling load have been considered. | ~1,000,000 sq. ft. roof space (~20% of buildings) by 2020 | New or Existing Development | Voluntary |
| **E-4.1:** Continue implementing the Green Building Ordinance. | 1,860 MT $CO_2e$/yr | Continue implementing Green Building Ordinance. | N/A | New Development | Mandatory |
| **E-5.1:** Work to accelerate Smart Grid integration in existing and new buildings. | 3,550 MT $CO_2e$/yr | N/A | N/A | New and Existing Development | Voluntary |
| **E-6.1:** Develop program to facilitate the installation of solar hot water heaters in homes. | 4,170 MT $CO_2e$/yr | Percentage of residences that have installed a solar hot water system. | 35% of residences with solar hot water by 2020 | New or Existing Development | Voluntary |
| **E-7.1:** Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to homeowners. | 2,990 MT $CO_2e$/yr | Percentage of residences that have installed a renewable energy system. | 25% of residences with solar PV by 2020 | New or Existing Development | Voluntary |
| **E-7.2:** Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | 2,910 MT $CO_2e$/yr | Percentage of commercial and industrial buildings that have installed a renewable energy system. | 25% of buildings with solar PV by 2020 | New or Existing Development | Voluntary |
| **E-8.1:** Explore opportunities to reduce energy consumption of wastewater facility through methane-to-energy production, as well as solar PV installation. | 560 MT $CO_2e$/yr | Additional renewable energy generation installed Capacity. | 1-MW methane-to-energy<br>150-kW of solar PV | Public Facilities | Voluntary |
| **WASTE REDUCTION ACTION AREA** | | | | | |
| **WR-1.1:** Increase Waste Diversion Target to 90 percent. | 8,920 MT $CO_2e$/yr | Interim Waste Diversion Target at 2015. | 82.5% | New or Existing Development | Mandatory |
| | | Waste Diversion Target at 2020. | 90% | | |

**Table 4-1: Summary of Climate Action Plan Progress Indicators *Continued***

| Measure | GHG Emissions Reduction | Progress Indicators | | Sector Applicability | Mandatory or Voluntary |
|---|---|---|---|---|---|
| **WATER CONSERVATION ACTION AREA** | | | | | |
| **WC-1.1:** Water Efficient Landscape Ordinance. | 290 MT $CO_2e$/yr | Amend Water Efficient Landscape Ordinance. | 2012 | New and Existing Development | Mandatory |
| **WC-1.2:** Indoor and Outdoor Non-potable Water Systems Program. | 240 MT $CO_2e$/yr | Percentage of buildings that incorporate a recycled water system for indoor use. | 10% | New or Existing Development | Voluntary |
| | | Percentage of buildings that incorporate a rainwater collection system for outdoor use. | 30% | | |
| **WC-2.1:** Work with Alameda County Water District to expand outreach programs and incentivize water conservation throughout Union City. | 350 MT $CO_2e$/yr | Percentage of buildings that utilize incentive programs in order to fund water conservation measures that achieve, on average, a 20 percent reduction in water consumption. | 25% | New or Existing Development | Voluntary |
| **GREEN INFRASTRUCTURE ACTION AREA** | | | | | |
| **GI-1.1:** Expand the urban forest to sequester carbon and reduce building energy consumption. | 1,600 MT $CO_2e$/yr | Total number of trees planted by 2020. | 5,000 trees | Public | Mandatory |
| **STATE LEVEL REDUCTIONS** | | | | | |
| **AB 1493:** 20,620 MT $CO_2e$/yr | | | | | |
| **Low Carbon Fuel Standards (LCFS):**11,020 MT $CO_2e$/yr. | | | | | |
| **Renewable Energy Portfolio Standard (RPS) :** 22,040 MT $CO_2e$/yr | | | | | |

## Plan Evaluation and Evolution

The 2010 CAP represents the City's best attempt to create an organized, community-wide response to the threat of climate change at the time of preparation. Staff will need to evaluate the plan's performance over time and be ready to alter or amend the plan if it is not achieving the reduction target.

### Plan Evaluation

Two types of performance evaluation are important: evaluation of the CAP as a whole and evaluation of the individual component measures. Community-wide GHG emission inventories will provide the best indication of CAP effectiveness, although it will be important to reconcile actual growth in the City versus the growth projected when the CAP was developed. Conducting these inventories periodically will allow direct comparison to the 2005 baseline inventory and will demonstrate the CAP's ability to achieve the adopted reduction target. The City will coordinate a community-wide inventory in 2015, with another inventory conducted in 2020 to gauge the level of GHG reduction target attainment.

While community-wide inventories will provide information about overall GHG reductions, it will also be important to understand the effectiveness of the measures.

Evaluation of the emissions reduction capacity, costs, and benefits of individual measures will improve staff and decision makers' ability to manage and implement the CAP. The City can promote successful measures and reevaluate or replace under-performing measures. Evaluating measure performance will require data regarding community participation rates and measurement of GHG reduction capacity.

The City's Manager's Office in conjunction with the Economic and Community Development Department (ECD) will coordinate measure evaluation on the same schedule as the community-wide inventories, and summarize the progress towards meeting the GHG reduction target in a report that describes:

- Estimated annual GHG reductions in 2020
- Achievement of progress indicators
- Participation rates (where applicable)
- Implementation costs
- Cost savings and payback (when feasible)
- Community co-benefits realized
- Remaining barriers to implementation

If a more frequent progress review period is deemed appropriate, it would be necessary to institute an annual or bi-annual monitoring program that tracks the performance of individual measures. The data collection and processing necessary to establish performance levels would be conducted by the responsible parties identified for each measure (as noted in the measure text), and summarized at the level of each Action Area, as well as the CAP as a whole. However, while these interim progress reports will be useful in tracking performance and making the appropriate adjustments, it should be recognized that a community-level GHG inventory is the only defensible way through which to certify the achievement of a GHG reduction for Union City.

### Plan Evolution

To remain relevant, the City must be prepared to adapt and evolve the CAP over time. It is likely that new information about climate change science and risk will emerge, new GHG reduction technologies and innovative municipal strategies will be developed, new financing options will materialize, and State and federal legislation will advance. It is also possible that community-wide inventories will indicate that the community is not achieving its adopted target. As part of the evaluations identified above, the City will assess the implications of new findings in the field of climate change, explore new opportunities for GHG reduction and climate adaptation, respond to changes in climate policy, and incorporate relevant changes to ensure an effective and efficient CAP.

## Estimated Staff Resources for CAP Implementation

The successful implementation of the CAP will, in great part, be achieved through voluntary programs that will be managed and overseen by City staff. The emphasis on voluntary programs was a result of feedback from City staff, community members, and local professionals that the CAP should limit the number of mandates imposed on the community. Consequently, many measures require staff time and resources to develop programs, implement outreach campaigns, and oversee policy development such as ordinances. Since there are many potential synergies in measure implementation (i.e., energy efficiency and solar programs for residences may have joint implementation as the target audience of that suite of measures is the same constituency), it was logical that staff resource needs would be assessed

at the level most appropriate for implementation – the Action Area level. Thus, the cumulative staff resources for each Action Area were assessed, with the results shown in the table below. For the purposes of this analysis, it was assumed that the average full time equivalent (FTE) employee would require approximately $150,000/year to support, which includes both salary and benefits (based on FY 2010-11). See Appendix C for more details on the costs and savings analysis.

It should be noted that these staff resource requirements do not necessarily represent additional City hires; the staff time requirements to implement the CAP could potentially be included (or are already included) in an existing staff member's job description and responsibilities. It is left to the discretion of the City to determine the additional hiring needs for CAP implementation.

**Estimated Staff Time Requirements to Implement CAP**

| Action Area | | Estimated Staff Resource Requirements | Annual Estimated Cost (2010 dollars) | Cost Category |
|---|---|---|---|---|
| LU | Land Use | ~0.10 – 0.20 FTE | $15,000 - $30,000 | Low - Medium |
| T | Transportation | ~0.20 – 0.30 FTE | $30,000 - $45,000 | Medium |
| E | Buildings and Energy | ~0.80 – 1.00 FTE | $120,000 - $150,000 | High |
| WR | Waste Reduction | ~0.20 – 0.40 FTE | $30,000 - $60,000 | Medium |
| WS | Water Conservation | ~0.20 – 0.30 FTE | $30,000 - $45,000 | Medium |
| GI | Green Infrastructure | ~0.10 – 0.20 FTE | $15,000 - $30,000 | Low - Medium |

## Relationship to the California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires the City to identify the significant environmental impacts of its discretionary actions and to avoid or mitigate those impacts, if feasible. GHG emissions are an environmental issue that requires analysis under CEQA (CEQA Guidelines section 15064.4 and Appendix G). When the City undertakes a discretionary action for a "project" under CEQA, such as approval of a proposed development project, plan, policy, or code change, the City will evaluate whether that action would result in a significant impact due to greenhouse gas emissions and climate change under CEQA.

The adoption of the CAP by the City is likely a "project" under CEQA. Since it is a plan to protect the environment and reduce environmental impacts (due to GHG emissions or climate change), there is an argument that the CAP may not constitute a "project" or may qualify for an exemption under CEQA. The overall purpose of the CAP is to reduce the impact that the community will have on global climate change and, therefore, reduce an impact on the environment. However, as with any proposal involving activities relating to development, implementation of the CAP could potentially result in adverse impacts on the physical environment. Therefore, an Initial Study and Negative Declaration are being prepared by the City pursuant to CEQA to evaluate whether there are any potential adverse environmental impacts of implementing certain reduction measures under the CAP.

State law allows cities to analyze and mitigate significant GHG emissions in a CAP or GHG reduction plan that meets certain requirements under CEQA (CEQA Guidelines section 15183.5). The CAP was developed to serve as the City's qualified GHG Reduction Plan and programmatic tiering document for the purposes of the CEQA for analysis of impacts of GHG emissions and climate change. The City has determined that the Reduction Target under the CAP will result in GHG emissions from activities covered by the CAP to be less than cumulatively considerable under CEQA. The substantial evidence to support

this determination is set forth in the CAP, documents referenced in the CAP and other parts of the record relating to the adoption of the CAP. Because the CAP has undergone CEQA environmental review and is intended to reduce GHG emissions and climate change impacts in the City to a less than cumulatively considerable level, it may be relied upon to address the cumulative impacts for future projects consistent with the CAP. This approach is consistent with CEQA Guidelines Sections 15183.5, 15064 and 15130 and the adopted BAAQMD CEQA Guidelines and Thresholds of Significance, which provide a means for jurisdictions to analyze and mitigate the significant effects of GHG emissions at a programmatic level by adopting a plan for the reduction of GHG emissions. Later, as individual projects are proposed that are consistent with the CAP, the project would be considered to have a less than significant impact (i.e., less than cumulatively considerable contribution) from GHG emissions and climate change.

The CAP and its environmental review may be relied upon for the programmatic analysis of GHG emissions and climate change for future proposed project if the following standards are met:

- The project supports or includes applicable strategies and measures, or advances the actions identified in the CAP.
- The project is consistent with the ABAG population growth projections, which are the basis of the GHG emissions inventory's projections.
- The project would not substantially interfere with implementation of CAP strategies, measures, or actions.

A project and its CEQA environmental review that relies on this CAP for its GHG emissions and climate change analysis must identify the specific CAP measures applicable to the project and how the project incorporates the measures. If the measures are not otherwise binding and enforceable, they must be incorporated as conditions of approval or mitigation measures applicable to the project. If the City determines in its environmental review that the proposed project would not substantially comply with the CAP's emissions projections or GHG reduction policies or programs, the applicant could consider various methods for making the Project consistent with the CAP, including, but not limited to, revising the project or incorporating alternative reduction measures (including, offsets), to make the Project's GHG emissions levels consistent with the CAP. The impact on GHG emissions from a project may also be determined to be less than significant under CEQA through an alternative analysis using a standard of significance that is supported by substantial evidence, such as BAAQMD's numerical thresholds (<1,000 MT CO2e per year or 4.6 MT $CO_2e$ per service population (residents and employees) per year). A determination that a Project does not substantially comply with the CAP shall not in and of itself provide substantial evidence that a Project's impact from GHG emissions is a significant impact under CEQA. It only means that the Project may not be able to rely on the CAP for a determination that the Project's impact is less than significant due to greenhouse gas emissions and climate change (i.e., less than cumulatively considerable contribution to significant cumulative impact).

## BAAQMD Guidelines

In 2005, the Bay Area Air Quality Management District (BAAQMD) adopted a resolution to initiate a Climate Protection Program, recognizing the link between climate protection and programs to reduce air pollution in the Bay Area. In 2009, climate protection was added to the Air District's mission, identifying its commitment to pursuing greenhouse gas reduction through all District programs and initiatives.

In June 2010, the BAAQMD produced updated CEQA guidelines which included for the first time thresholds of significance related to GHG emissions from plans and projects. The approach to developing the thresholds was to identify levels for which a project would not be expected to conflict with AB32 legislation. If a project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact, and would be considered significant. The threshold for

GHG emissions at a plan level is compliance with a qualified GHG reduction strategy or 6.6 MT $CO_2e$/service population/yr. This CAP qualifies as a GHG reduction strategy as per the BAAQMD in terms of GHG quantification and measure development; achieving a 20 percent reduction in GHG emissions below 2005 levels by 2020 will reduce the GHG emission to service population ratio to approximately 2.5 (see calculation below).

| GHG Emissions to Service Population Ratio Calculation | | | | |
|---|---|---|---|---|
| Union City Projected Population in 2020 (source: ABAG) | Union City Projected Employees in 2020 (source: ABAG) | Projected Service Population in 2020 (source: calculated) | 2020 anticipated GHG emissions MT $CO_2e$/yr (assuming 20% reduction target) | Ratio MT $CO_2e$/yr to Service Population in 2020 |
| 85,200 | 24,860 | 110,060 | 273,838 | **2.5** |

See Appendix F for more details on BAAQMD qualification standards.

## Funding Sources and Financing Mechanisms

This section describes potential funding sources and financing mechanisms that Union City could pursue to offset the financial burden of implementing the CAP measures described in Chapter 3. Each measure is accompanied by an analysis of costs and savings, and potential funding sources, financing strategies, and partnership opportunities.

The spectrum of public and private funding options for the measures outlined in this CAP is ever evolving. This section outlines viable funding options that are current, but could eventually become out of date. However, there are general sources of funding that provide the most up-to-date information, including:

- U. S. Department of Energy (DOE)
- Environmental Protection Agency (EPA)
- US Department of Housing and Urban Development (HUD)
- California Energy Commission (CEC)
- California Infrastructure and Economic Development Bank
- Metropolitan Transportation Commission (MTC)
- Association of Bay Area Governments (ABAG)
- Pacific Gas & Electric (PG&E)
- Alameda County Water District (ACWD)
- Union Sanitary District (USD)
- TransForm
- Alameda County Transit (AC Transit)
- Bay Area Air Quality Management District (BAAQMD)

### Costs & Savings

The City is not the only entity bearing financial responsibility for implementing for CAP measures; there will be a private cost borne by residents and businesses for specific measures. In recognition of this, a costs and savings analysis was performed for each measure to evaluate the cost to the City, as well as potential costs and savings to residents or property owners. A summary of this analysis can be found in Chapter 3, with analytical background information provided in Appendix B. Generally, the implementation costs to the City for the creation of programs, which consist primarily of initial start-up costs and ongoing administration/enforcement costs, range considerably from negligible additional costs to on the order of several hundred thousand dollars.

Measures vary in the distribution of costs. Some measures require only funding from the City or other public entities, whereas others require that residents and businesses contribute. In nearly all measures

that require some investment by residents or business owners, there are substantial long-term savings that will allow recuperation of initial investments, as well as other benefits such as improved air quality or publicly-owned spaces such as streetscapes, open spaces, rights-of-way, etc. There are also measures that require no private investment, but generate savings for the resident or business owner.

## Funding Strategy

The CAP will require strategic public funding by the City, regional government agencies, and the state government for capital projects, incentives, outreach/education, and new regulations necessary to achieve the plan's objectives. To decrease costs and improve the plan's efficiency, actions should be pursued concurrently whenever possible. For example, the City should pursue land use and transportation-related actions together during upcoming General Plan updates and in the development of Specific Plans. The City could also look to address water- and waste-related measures with the related utilities and agencies (e.g., ACWD and the Union Sanitary District/Stopwaste.Org); inter-agency collaboration will be paramount to the success of the CAP.

Funding sources have not been identified for all actions; however, numerous federal, State, and regional grants are available to assist with funding. More details on these programs and others follow in the subsequent sections.

Additionally, Union City should partner with nearby cities and jurisdictions to administer joint programs when feasible. As many businesses in the Bay Area are leaders in resource efficiency, renewable energy, and green infrastructure, potential opportunities exist to partner with the private sector to decrease implementation costs. Finally, many of the measures and actions have the potential to be self-financing if properly designed and implemented.

## Transportation-related Incentives and Programs

Many State and regional grant programs are available to fund transportation and infrastructure improvements. The programs listed below represent the current status of the most relevant of these programs. It is, however, important to evaluate the status of a given program before seeking funding, as availability and application processes are updated periodically.

### *Transportation Fund for Clean Air*

The Transportation Fund for Clean Air (TFCA) is a Bay Area Air Quality Management District (BAAQMD) grant program funded by a surcharge on motor vehicles registered in the Bay Area. The purpose of the TFCA program is to provide grants to support Bay Area projects that will decrease motor vehicle emissions and improve air quality.

TFCA funds are available through two main channels: the Regional Fund and the County Program Manager Fund. The Regional Fund receives about 60 percent of the TFCA revenues and is administered directly by BAAQMD. The Program Manager Fund receives approximately 40 percent of the TFCA revenues and is administered in coordination with the Bay Area's nine county Congestion Management

Agencies (CMAs). Total yearly funds (2010) are approximately $22 million, which is generated through a $4 surcharge on vehicles registered in the Bay Area.

The TFCA program can fund a wide range of project types, including the purchase or lease of clean air vehicles; shuttle and feeder bus service to train stations; ridesharing programs to encourage carpool and transit use; bicycle facility improvements such as bike lanes, bicycle racks, and lockers; arterial management improvements to speed traffic flow on major arterials; smart growth projects; and projects to enhance the availability of transit information.

### *Safe Routes to Transit*

Bicycling and walking are cost-effective and sustainable ways to reach regional transit stations, yet many commuters cite safety as the main reason they drive instead. Safe Routes to Transit (SR2T) promotes bicycling and walking to transit stations by funding projects and plans that make important feeder trips easier, faster, and safer. Improvements in the safety and convenience of bicycling and walking to regional transit will give commuters the opportunity to leave their cars at home.

The Safe Routes to Transit Program awards $20 million in grants to facilitate walking and bicycling to regional transit. The program is funded by Regional Measure 2 ($1.00 bridge toll increase) and is administered by TransForm and the East Bay Bicycle Coalition.

To date (2010), nearly $8 million has been awarded to over 20 capital and planning projects. Funding cycles are approximately every two years, with the most recent round of awards in November 2009.

### *MTC Livable Communities & Housing Incentive Program*

The purpose of MTC's Transportation for Livable Communities (TLC) Capital and Planning Program is to support community-based transportation projects that bring new vibrancy to downtown areas, commercial cores, neighborhoods, and transit corridors by enhancing their amenities and ambiance and making them places where people want to live, work, and visit. TLC provides funding for projects that are developed through an inclusive community planning effort, provide for a range of transportation choices, and support connectivity between transportation investments and land uses.

As part of the TLC program, the Housing Incentive Program (HIP) rewards local governments that build housing near transit stops. The key objectives of this program are to:

- Increase the housing supply in areas of the region with existing infrastructure and services in place
- Locate new housing where non-automotive transportation options are viable transportation choices
- Establish the residential density and ridership markets necessary to support high-quality transit service

HIP funds are intended for transportation capital projects that support TLC goals, such as pedestrian and bicycle facilities that connect housing projects to adjacent land uses and transit; improved sidewalks and crosswalks linking housing to a nearby community facility, such as a school or public park; or streetscape improvements that support increased pedestrian, bicycle, and transit activities and safety.

### *MTC Transit-Oriented Development Policy*

To promote cost-effective transit, ease regional housing shortages, create vibrant communities and preserve open space, MTC has adopted a Transit-Oriented Development (TOD) policy that will be applied to transit extension projects in the Bay Area. MTC's TOD policy includes three key elements:

- Corridor-based performance measures to quantify minimum thresholds of development around transit stations, based on the transit mode; higher thresholds with more capital-intensive modes, such as BART.
- Aid for funding Station Area Plans (SAPs) to promote a jobs and housing balance, station access, design standards, parking and other amenities based on unique circumstances, and community character.
- Creation of corridor working groups to bring together local government staff, transit agencies, county congestion management agencies (CMAs) and other key stakeholders along the corridor to help develop station area plans to meet MTC's corridor-wide land-use thresholds.

As this policy is still in development, the City should keep track of its progress and applicability to the CAP.

### *Safe Routes to Schools*

Safe Routes to Schools is an international movement focused on increasing the number of children who walk or bicycle to school by funding projects that remove barriers to doing so. These barriers include lack of infrastructure, safety, and limited programs that promote walking and bicycling through education/ encouragement programs aimed at children, parents, and the community. In California, two separate Safe Routes to School programs are available: the State program referred to as SR2S, and the federal program referred to as SRTS; both fund qualifying infrastructure projects.

According to the Union City Pedestrian and Bicycle Master Plan, Union City schoolchildren walk and bicycle to school at varying rates. The Bay Area Transportation Survey, conducted in 2000 by the Metropolitan Transportation Commission, found that 29% of grade school children in the South County Area of Alameda County (which includes Union City, Newark and Fremont) walk to school, and 13 percent of high school students within this area walk. Within Union City itself, school officials from Alvarado Middle School, Barnard-White Middle School, and Alvarado, Cabello, Eastin, and Kitayama Elementary Schools estimate that more than 50 percent of their student body is already walking to school. Other campuses, like Cesar Chavez Middle School and James Logan High School could easily accommodate more students walking and biking to school. Nearly all schools have a supply of bicycle parking that exceeds demand for the spaces, with the exception of Kitayama and Cabello Elementary Schools. Most schools surveyed reported barriers to walking and bicycling including heavy traffic, frequent speeding and unsafe street crossings. Several Union City schools do not have crossing guards, making walking and bicycling to school more challenging for young students. Traffic from parents picking-up and dropping-off students is significant at some school sites, creating both congestion problems and safety concerns. School-area signage and striping are not up-to-date with the most recent MUTCD standards at several school sites in Union City.

In 2003, Union City received a Safe Routes to School (SR2S) grant in the amount of $500,000. The SR2S funding was used in conjunction with other funds (Transportation Development Act, Alameda County Measure B, and Union City Redevelopment Agency) for pedestrian improvements along portions of Whipple Road, from Railroad Avenue to Ithaca Street and in front of Barnard-White Middle School. The project was a joint effort of the Railroad Safety Committee, the New Haven Unified School District and City staff.

### *Alameda County Transportation Improvement: CALTRANS Planning Grants*

Community Based Transportation Planning (CBTP) grants fund transportation and land use planning that promotes public engagement, livable communities, and a sustainable transportation system (e.g., mobility, access, and safety). The maximum award is $300,000, and a local match of 20 percent of the grant request is required.

## Energy-related Incentives and Programs

Many of the financing and incentive programs relevant to the CAP concern energy infrastructure and conservation. Some of these programs are tied to the ARRA economic stimulus package enacted by Congress in February 2009. Access to these funds will be available for a limited period, and the City should seek the most up-to-date information regarding the programs listed below.

### *Energy Upgrade California*

www.energyupgradecalifornia.com/

www.acgreenretrofit.org/

The Energy Upgrade California is a program under the State Energy Program (SEP), which is administered by the CEC. The purpose of the Program is to create jobs and stimulate the economy through a comprehensive program to implement energy retrofits in existing residential buildings. The Program will focus on deploying re-trained construction workers and contractors, and youth entering the job market to improve the energy efficiency and comfort of California's existing housing, creating a sustainable energy workforce in the process.

The Association of Bay Area Governments (ABAG) administers this region-wide energy retrofit program for residential home energy retrofits. Across the Bay Area, this program is targeted to achieve energy efficiency upgrades in up to 15,000 single family and 2,000 multi-family residences. Specifically with Alameda County, the goal for the Energy Upgrade California Program is to improve the energy efficiency of 8,500 housing units in the County by 2012. Program elements include homeowner rebates to attract participation, as well as contractor business expansion loans and scholarships, green workforce training, and an expansive outreach campaign.

The program is designed to:

- Establish sets of verifiable retrofit standards for energy efficiency and other green improvements that are easy for building owners and contractors to understand
- Train contractors to implement these standards in their retrofit projects
- Create quality assurance procedures to help ensure that retrofit work meets program requirements and performance expectations
- Offer financing for eligible improvements through CaliforniaFIRST
- Bundle potential rebates and other incentives to make them more accessible to property owners
- Conduct a countywide marketing and public outreach campaign to get the word out to property owners and building industry contractors about best practices for energy efficiency and green retrofits, as well as financing and incentive opportunities.

### *Flex Your Power*

www.fypower.org

Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and nonprofit organizations working to save energy. The campaign includes a comprehensive website, an electronic newsletter and blog, and educational materials. The website provides regularly updated information on financial incentives and technical assistance for energy-efficient appliances, equipment, lighting and buildings. This information is available for residential, commercial, industrial and institutional consumers.

As existing programs evolve and new programs are created, Flex Your Power is a clearinghouse for information. Current incentives listed include:

- The California Preschool Energy Efficiency Program (CPEEP) provides child care facilities with energy audits and retrofits.
- The Enhanced Automation Initiative (EAH) pays large commercial and institutional customers to improve energy efficiency of existing building automation systems or energy management systems.
- The School Energy Efficiency program (SEE) provides cash incentives for installing a variety of energy efficiency measures.
- The Savings by Design program provides design assistance and financial incentives to commercial, industrial, institutional and agricultural building owners and design teams to promote energy efficient design and construction practices.

### *California Solar Initiative*

www.gosolarcalifornia.org/csi/index.php

The California Solar Initiative (CSI) is the solar rebate program for California consumers who are customers of investor-owned utilities, such as PG&E. The CSI Program pays solar consumers an incentive based on system performance. For existing homes, existing or new commercial, agricultural, government, and non-profit buildings, this program funds both solar photovoltaics (PV), as well as other solar thermal generating technologies. Additionally, for homes and businesses, this program funds solar hot water systems. An additional rebate is available for single-family homes owned by low-income residents or multi-family affordable housing.

The CSI solar incentives differ by customer segment and size, and are intended to encourage high performing systems. There are two types of incentives available through the CSI program: Expected Performance-Based Buydown (EPBB) and Performance-based Incentives (PBI). EPBB is a one time, up-front payment based on an estimate of the system's future performance. For solar projects with a system larger than 30 kW, PBI are monthly payments for 5 years based on actual performance (output) of the system. The incentive rate is based on the incentive type—EPBB or PBI, and the relevant customer segment—residential, commercial or government/non-profit and current incentive step.

The CSI solar thermal hot water program will run for eight years, ending on December 31, 2017. To qualify of the CSI-Thermal rebate amounts differ by customers' system size, class (e.g., residential or commercial) and water heating fuel source (e.g., gas or electric).

### *California Feed-In Tariff*

www.cpuc.ca.gov/PUC/energy/Renewables/hot/feedintariffs.htm

The California feed-in tariff allows eligible customer-generators to enter into 10-, 15- or 20-year standard contracts with their utilities to sell the electricity produced by small renewable energy systems -- up to 3 megawatts (MW) -- at time-differentiated market-based prices. Time-of-use adjustments will be applied by each utility and will reflect the increased value of the electricity to the utility during peak periods and its lesser value during off-peak periods. These tariffs are not available for facilities that have participated in the California Solar Initiative (CSI), Self-Generation Incentive Program (SGIP), Renewables Portfolio Standard, or other ratepayer funded generation incentive programs, including net-metering tariffs.

For customers generating renewable energy not covered by the CSI or SGIP (e.g., biomass or geothermal) the feed-in tariff is applicable. If customers prefer a long-term contract at a fixed price over a financial incentive paid in the short term, feed-in tariffs may be a beneficial financing tool.

### *Property Assessed Clean Energy (PACE)*

www1.eere.energy.gov/wip/solutioncenter/financialproducts/pace.html

A property-assessed clean energy (PACE) finance program is enabled through the AB811 legislation. A PACE program permits property owners within participating regions to finance the installation of energy and water improvements within their home or business and pay back the amount as a line item on their property tax bill. This bill allows land-secured loans for homeowners and businesses who install energy-efficiency projects and clean-energy generation systems to be paid back through assessments on individual property tax bills. If the property is sold, the outstanding loan balance is taken over by the new owner, allowing property owners to avoid up-front installation costs, while at the same time requiring little or no investment of local government general funds.

Recent legislation, AB474, expanded the program's reach to include the financing of water efficiency projects. Eligible projects under a PACE program may include, but are not limited to: air sealing, wall and roof insulation, energy-efficient windows, tankless water heaters, solar photovoltaics, and low-flow toilets.

### *California Energy Commission Energy Efficiency Financing*

http://www.energy.ca.gov/efficiency/financing/index.html

The California Energy Commission offers low-interest loans for public institutions to finance energy-efficient projects. Interest rates are currently at 3%. Projects with proven energy and/or capacity savings are eligible, provided they meet the eligibility requirements. Examples of projects include:

- Lighting systems
- Pumps and motors
- LED streetlights and traffic signals
- Automated energy management systems/controls
- Building insulation
- Renewable energy generation and combined heat and power projects
- Heating and air conditioning modifications
- Waste water treatment equipment

Loans for energy projects must be repaid from energy cost savings within 15 years, including principal and interest (approximately 13 years simple payback for the one percent interest rate funding and approximately 11 years simple payback for the three percent interest rate funding). Simple payback is calculated by dividing the dollar amount of the loan by the anticipated annual energy cost savings.

Only project-related costs, with invoices dated after loans are officially awarded by the Energy Commission at a Business Meeting, are eligible to be reimbursed from loan funds. The final ten percent of the funds will be retained until the project is completed. Interest is charged on the unpaid principal computed from the date of each disbursement. The repayment schedule is up to 15 years and will be based on the annual projected energy cost savings from the aggregated projects.

### *School Facility Program – Modernization Grants*

www.opsc.dgs.ca.gov/Programs/SFProgams/Mod.htm

The School Facility Program (SFP) provides funding assistance to school districts for the modernization of school facilities. The assistance is in the form of grants approved by the State Allocation Board (SAB), and requires a 40 percent local contribution. A district is eligible for grants when students are housed in permanent buildings 25 years old or older and relocatable classrooms 20 years old or older and the buildings have not been previously modernized with State funds. The modernization grant can be used to fund a large variety of work at an eligible school site including but not limited to air conditioning, insulation, roof replacement, as well as the purchase of new furniture and equipment.

### *Infrastructure State Revolving Fund Program*

www.ibank.ca.gov/infrastructure_loans.htm

The Infrastructure State Revolving Fund Program provides direct low-cost loans for local governmental public infrastructure projects, including:

- City Streets
- City Highways
- Environmental Mitigation Measures
- Parks and Recreational Facilities
- Public Transit
- Solid Waste Collection and Disposal

Union City can consider applying for these low-interest loans to implement a wide range of CAP measures. Though some eligible projects would be considered public projects, other eligible projects are pertinent to specific measures in this CAP. In particular, the transportation- and waste-related measures could seek financing through this program. Loans are available in amounts ranging from $250,000 to $10 million per applicant for Tier 1 loans, and $250,000 to $2.5 million per applicant for Tier 2 loans (the tier system is based on evaluation of project impact; the greater the project impact, the higher the cap on available funds).

### *CPUC Self Generation Incentive Program*

www.cpuc.ca.gov/PUC/energy/DistGen/sgip/

The CPUC's Self-Generation Incentive Program (SGIP) provides incentives to support existing, new, and emerging distributed energy resources. The SGIP provides rebates for qualifying distributed energy systems installed on the customer's side of the utility meter. Qualifying technologies include wind turbines, fuel cells, and corresponding energy storage systems.

## Energy-related Bond Financing

### *Qualified Energy Conservation Bonds (QECBs)*

A Qualified Energy Conservation Bond (QECB) is a tax credit bond; issuers repay principal on a regular schedule, but generally do not pay interest. Instead, the holder of a QECB receives a federal tax credit in lieu of interest, which may be applied against the bond holder's regular and alternative minimum tax liability. The tax credit amount is treated as taxable interest income to the holder of the bonds. For example, if the tax credit amount is $100 and the holder is in the 35 percent tax bracket, the credit provides a $65 benefit to the holder. Under the current program, QECBs must be issued by the end 2010, though this program is likely to be renewed for the foreseeable future.

The proceeds of the QECBs can be used for one or more or the following "qualified conservation purposes":

- Type I: Capital expenditures incurred for purposes of (i) reducing energy consumption in publicly-owned buildings by at least 20 percent, (ii) implementing green community programs (including the use of loans, grants, or other repayment mechanisms to implement such programs), (iii) rural development involving the production of electricity from renewable energy resources, or (iv) any qualified facility eligible for the production tax credit under Section 45 of the IRS Code.
- Type II: Expenditures with respect to research facilities and research grants to support research in: (i) development of cellulosic ethanol or other non-fossil fuels; (ii) technologies for the capture and sequestration of carbon dioxide produced through the use of fossil fuels, (iii) increasing the efficiency of existing technologies for producing non-fossil fuels; (iv) automobile battery technologies and other technologies to reduce fossil fuel consumption in transportation, or (v) technologies to reduce energy use in buildings
- Type III: Mass commuting and related facilities that reduce the consumption of energy, including expenditures to reduce pollution from vehicles use
- Type IV: Demonstration projects designed to promote the commercialization of (i) green building technology; (ii) conversion of agricultural waste for use in the production of fuel or otherwise; (iii) advanced battery manufacturing technologies; (iv) technologies to reduce peak use of electricity; or (v) technologies for the capture and sequestration of carbon dioxide emitted from combining fossil fuels to produce electricity
- Type V: Public education campaigns to promote energy efficiency

Though some eligible projects would be considered public projects, other eligible projects are pertinent to specific measures in this CAP. In particular, the following eligible project types could have broad applicability in funding the measures in this CAP: Type II-(ii) green community programs, Type III mass commuting facilities, and Type V public education campaigns.

### *Clean Renewable Energy Bonds (CREBs)*

Renewable energy projects, when compared to conventional generation facilities, are much more expensive and less economically feasible for many electric cooperatives. By providing low-cost loans through the Clean Renewable Energy Bonds (CREBs), this program aims to make renewable energy projects more affordable to the rural communities, electric cooperatives, and public power systems served.

CREBs are part of the Energy Policy Act of 2005, designed to give electric cooperatives and public power systems an incentive to develop clean, renewable energy sources by providing very low-cost capital. They are designed to provide a similar incentive to the production tax credit (PTC) program, currently offered to private investors and IOUs.

Under the Energy Policy Act, a qualified issuer, such as an electric cooperative or cooperative lender, can issue CREBs. Instead of the issuer paying interest to the bondholder, the federal government provides a tax credit to the bond purchaser. The proceeds from these bonds are then available to finance new renewable energy projects. Electric cooperatives or public power suppliers can apply for a low-cost loan for a qualified renewable energy project. (Electric cooperatives and public power entities can also issue CREBs.)

The same projects that qualify under the production tax credit program are eligible under this program, such as:

- Solar

- Wind
- Closed-loop biomass
- Refined coal production
- Small irrigation power
- Landfill gas
- Qualified hydropower

## Other Climate-related Programs

### *CAL FIRE Climate Change Program*

Under the authority of the Urban Forestry Act, the Urban Forestry Program offers grants of over $1 million dollars per year to plant trees, and over $2.5 million for related forestry projects in urban communities throughout California.

CAL FIRE has identified five forestry strategies for reducing or mitigating GHG emissions, which are:

- Reforestation to promote carbon sequestration
- Forestland conservation to avoid forest loss to development
- Fuel reduction to reduce wildfire emissions and utilization of those materials for renewable energy
- Urban forestry to reduce energy demand through shading, increase sequestration, and contribute biomass for energy generation
- Improved management to increase carbon sequestration benefits and protect forest health

These strategies were recognized by the Governor's Climate Action Team reports in 2006 and 2007, and by the Air Resources Board in its Climate Change Scoping Plan.

### *Climate Corps Bay Area*

sites.google.com/site/climatecorpsbayarea/Join-CCBA/Site-information

CCBA receives funding to place AmeriCorps members with local governments, public agencies and other nonprofits to work on energy and climate projects. Each CCBA member spends 11 months (1,700 hours of service) working on emissions reductions projects for their site organization. During this term of service, members will directly help communities to reduce their GHG emissions. Members cannot work directly on policy development or policy advocacy efforts. The goal for this program is for participating members to provide direct service to communities by working on projects that:

- Realize measureable energy saving, clean energy and GHG reduction opportunities
- Engage community members in activities that yield measurable energy and GHG benefits
- Increase civic participation in community energy and climate efforts

### *Alameda County Water District Business Conservation Programs*

www.acwd.org/wc_business_programs.php5

Commercial, Institutional and Industrial customers can qualify for up to $150 for each high use, high volume toilet/urinal replaced with a qualifying High Efficiency Toilet (HET). Businesses or facilities may also qualify for up to $300 for each conventional washer replaced with a qualifying high-efficiency clothes washer. The Alameda County Water District also offers a water use efficiency survey program. As a part of this program, qualified water conservation specialists perform in-house surveys at no cost or obligation to participating businesses.

### *Alameda County Water District Residential Conservation Programs*

www.acwd.org/wc_business_programs.php5

Alameda County Water District provides homeowners with an opportunity to update their homes with the newest in water efficient fixtures with a free Water Saver Kit courtesy of ACWD. Each kit contains one high quality showerhead, one toilet flapper valve, faucet aerators, leak detection tablets and a flow meter bag.

## Partnerships with Private Companies and Other Organizations

The Bay Area is home to numerous private companies who provide renewable energy or green infrastructure. The success of the CAP depends in part on collaboration between these businesses and the City and public. For example, numerous companies are involved in developing electric plug-in auto charging station infrastructure throughout the Bay Area. PG&E, ACWD, and USD also administer numerous energy efficiency and water conservation programs that the City can leverage and help advertise to residents. Solar companies will also be an important asset to the CAP, as the advent of the Power Purchase Agreement (PPA) enables businesses, residents, and the City to install solar panels and access solar power at no cost. Partnering with new and existing businesses, will enable the City to save money and provide the community with the most up-to-date green infrastructure.

### *Power Purchase Agreements*

Renewable energy has become increasingly more accessible and cost-effective due to Power Purchase Agreements (PPAs). In a PPA, a private company or third party installs a renewable energy technology, often solar panels, at no cost to the consumer and maintains ownership of the installed panels, selling customers the power produced on a per kilowatt-hour basis at a contractually-established rate. The rate is lower than what customers pay their utility today, and increases at a fixed percentage (usually 2.5 to 4.0 percent) annually which is typically lower than the rate escalation by the utilities. In addition to installing the panels, the third party monitors and maintains the systems to ensure functionality. The contract period for a PPA is typically 15 years, at which point the third party will either uninstall the panels or sign a new agreement with the building owner. These agreements are ideal for demonstration projects implemented by the City and residents or businesses with interests in reducing the carbon emissions associated with energy consumption in their homes and businesses. This form of financing systems such as solar PV systems is becoming increasing popular in the Bay Area, with a number of companies specializing in this form of financial transaction.

### *Energy Savings Performance Contracting (ESPC)*

The basic concept of the ESPC is that an Energy Services Company (ESCO) guarantees the amount of energy saved, and further guarantees that the value of that energy would be sufficient to make the debt service payments as long as the price of energy does not fall below a stipulated floor price. The key benefits of the guaranteed savings include:

- The amount of energy saved is guaranteed
- The value of energy saved is guaranteed to meet debt service obligations down to a stipulated floor price
- The City carries the credit risk
- A smaller piece of the investment package goes to “buy” money
- Tax-exempt institutions can use their legal status for much lower interest rates
- ESCO carries only the performance risk

Typically, an ESPC project would have a simple payback of 10 years or less to allow for the cost of money and other fees to be included in the overall project payback. Lending institutions look for less than 15 years including all fees.

Typical projects include:

- Energy management systems
- Interior and exterior lighting
- Boiler replacement/repair of steam systems
- High-efficiency HVAC systems
- LED traffic systems
- Wastewater treatment plant pumps and motors

There are numerous ESCOs with track records in the Bay Area. As evidenced by the above project types, the ESPC financing option would be most applicable to municipal operations-related measures in this CAP. If the City were interested in demonstration projects for particular energy savings technologies, this financing mechanism would apply.

### *Energy Efficiency Mortgages*

www.hud.gov/offices/hsg/sfh/eem/energy-r.cfm

Energy Efficiency Mortgages can provide owners additional financing (whether at time-of-sale or upon refinancing) for energy efficiency improvements at discounted interest rates. Energy efficiency upgrades could be chosen that would allow owners to realize a net monthly savings. The goal is to provide capital for energy efficiency upgrades at a discounted interest rate. The Federal Housing Administration (FHA) offers an Energy Efficient Mortgage Loan program. This program helps current or potential homeowners significantly lower their monthly utility bills by enabling them to incorporate the cost of adding energy-efficient improvements into their new home or existing housing. This FHA program eliminates the need for homeowners who are interested in making their home more energy efficient to take out an additional mortgage to cover the cost of the improvements. The improvements can be included in a borrower's mortgage only if the total cost is less than the total dollar value of the energy that will be saved during its useful life. The program is available as part of a FHA-insured home purchase or by refinancing a current mortgage loan.

Energy Star™, a program under the DOE, offers another energy efficient mortgage option, though it is in its pilot phase and not currently available in California. This program is designed to encourage comprehensive energy efficiency improvements to new and existing homes by increasing the affordability and availability of energy efficiency mortgages for homeowners and homebuyers. These mortgages include the cost of energy efficiency investments in the loans themselves so that borrowers can pay for those investments over the life of their loans, as well as deduct the interest from their federal and State income taxes. One of the key benefits of an Energy Star™ mortgage is that a borrower can finance energy-saving improvements to their home without paying more than he/she would for a typical mortgage. Following the completion of the pilot phase, this program will be extended to California.

## Partnerships with Other Jurisdictions and Organizations

As Union City is a relatively small portion of Alameda County in terms of population, partnering with neighboring jurisdictions is another key implementation strategy supporting the CAP. Various jurisdictions within Alameda County could serve as potential partners in implementing the CAP strategies. The City should seek to partner with appropriate local governments, as identified in the CAP measure implementation sections, other potential partners including:

- Metropolitan Transportation Commission (MTC)
- Association of Bay Area Governments (ABAG)
- Pacific Gas & Electric (PG&E)
- Alameda County Water District (ACWD)
- Union Sanitary District (USD)

- TransForm
- Alameda County Transit (AC Transit)
- Stopwaste.Org
- East Bay Bicycle Coalition
- Build It Green
- California ReLeaf
- Slow Food
- Sustainable Agriculture Education (SAGE)
- United States Green Building Council (USGBC) – Northern California Chapter

## Union City Funds

Special Revenue Funds are restricted to expenditures for specific purposes. Many of these purposes are consistent with the Climate Action Plan, such as recycling awareness programs and the construction and maintenance and transit services. Sources of these funds include Federal and State grants and voter-approved taxes, fees and bonds. Of particular relevance to Union City's CAP are developer impact fees, which are collected for the purposes of providing adequate capital facilities improvements needed to serve new developments within the City. These fees are allocated to specific activities as per Municipal Code 18.105.160.

Redevelopment Agency Funds are used for the acquisition and construction of major capital facilities in Union City's Redevelopment Project Area. The primary source of these funds is property taxes and bond proceeds. The Redevelopment Agency can focus funds in a manner consistent with the CAP through land assemblage and construction of infrastructure around transit centers. Currently the Redevelopment Agency is involved in the planning and construction of the Intermodal Station District, a compact, pedestrian and transit-oriented community with housing, retail, office and public uses around the Union City BART Station.

The General Fund is the primary operating fund of the City. It is used to account for those resources traditionally associated with governments which are not required by law or administrative action to be accounted for in another fund. The General Fund is used to account for the cost of the City's current governmental operations.

## Self-Financing Strategies

CAP measures include a range of incentives and regulations to change the community's behavior. It is important that the fees established in the CAP be self-financing. The money raised through the fees would then be used to implement the CAP measures determined to provide the best mitigation results. Union City will actively explore opportunities to establish programs that are self-financing and thus sustainable over the long term.

This page was intentionally left blank.

# Appendix A: GHG Inventory

## Baseline GHG Emissions Inventory and Projected (2020) Emissions

This section provides a detailed description of the methodology used to develop the baseline (2005) and projected 2020 emissions inventory. Union City developed a baseline emissions inventory for the operational year 2005. This baseline emissions inventory serves as the foundation for the climate action plan (CAP) projected 2020 inventory and greenhouse gas (GHG) reduction goals. This section also provides a description of the methodology used to develop the projected 2020 business-as-usual emissions inventory. The project 2020 business-as-usual emissions inventory serves as the basis to which the GHG reduction measures are applied.

This inventory focuses on the three GHGs most relevant to local government policymaking: carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). These gases comprise a large majority of GHG emissions from the City's government operations. Converting emissions of non-$CO_2$ gases to units of $CO_2e$ allows GHGs to be compared on a common basis (i.e. on the ability of each GHG to trap heat in the atmosphere). Non-$CO_2$ gases are converted to $CO_2e$ using internationally recognized global warming potential (GWP) factors. GWPs were developed by the Intergovernmental Panel on Climate Change (IPCC) to represent the heat-trapping ability of each GHG relative to that of $CO_2$. For example, the GWP of $CH_4$ is 21 because one metric ton of $CH_4$ has 21 times more capacity to trap heat in the atmosphere than one metric ton of $CO_2$. The use of GWPs allows for each GHG to be converted to their carbon dioxide equivalent. Thus, for consistency purposes, and to more effectively compare Union City's emissions inventories with those developed for the AB 32 Scoping Plan, all GHG emissions were converted to metric tons of carbon dioxide equivalent per year (MT $CO_2e$/yr).

### Baseline Emission Inventory

As discussed in Chapter 1, the baseline emissions inventory is separated into the following emissions sectors: residential, commercial, and industrial energy consumption; transportation; solid waste disposal; and water consumption. A detailed description of the top-down GHG quantification methodology for each sector is provided below. A top-down approach to the inventory development was decided to be acceptable, as a bottom-up calculation would have exposed the GHG analysis to an unacceptable amount of data inconsistencies and inaccuracies. Furthermore See Table A-1 for a summary of the baseline GHG emissions.

#### *Energy Consumption*

Union City's electricity and natural gas consumption data for the year 2005 was provided by Pacific Gas and Electric (PG&E). PG&E provided annual electricity and natural gas consumption separated by residential, commercial, and industrial land uses. Electricity consumption was provided in units of kilowatt-hours and natural gas consumption was provided in units of therms. As part of PG&E's 15/15 Rule, any aggregated information provided by the utilities must be made up of at least 15 customers, and a single customer's load must be less than 15 percent of an assigned category. If the number of customers in the complied data is below 15, or if a single customer's load is more than 15% of the total data, categories must be combined before the information is released (e.g., commercial and industrial energy consumption). The 15/15 Rule was triggered for commercial and industrial electricity and natural gas consumption data received for Union City. The City revised the baseline inventory using a Bay Area Air Quality Management District (BAAQMD) ratio of commercial to industrial natural gas consumption to separate the commercial/industrial natural gas consumption GHG emissions. This ratio was not available for electricity consumption and therefore commercial and industrial electricity consumption are combined in the baseline inventory.

The GHG emissions associated with electricity and natural gas consumption were calculated using the PG&E-provided data and PG&E-specific emissions factors. The electricity emission factor, provided in units of pounds of carbon dioxide equivalent per kilowatt-hour (lb $CO_2e$/kWh), was developed using

PG&E's 2005 electricity production portfolio, which accounts for the types and amounts of energy sources (e.g., natural gas, hydroelectric, coal) used to generate electricity. The natural gas emission factor was provided in units of kilograms of $CO_2e$ per million British thermal units (kg $CO_2e$/MMBtu). Electricity and natural gas consumption data for residential, commercial, and industrial uses were multiplied by the appropriate emission factor and then converted to MT $CO_2e$/yr for the baseline emissions inventory.

### *Transportation*

Union City's transportation sector includes GHG emissions associated with motor vehicles traveling on local roadways and state highways. Motor vehicle activity, in units of vehicle miles traveled (VMT), was provided by the Metropolitan Transportation Commission (MTC) and California Department of Transportation (Caltrans). MTC provided year 2005 daily VMT data for motor vehicles traveling on local roads within Union City, which was multiplied by 365 to calculate annual VMT on local roads. Caltrans provided year 2005 daily VMT data for motor vehicles traveling on state highways within Union City, which was also multiplied by 365 to calculate annual VMT on state highways.

Some portion of state highway VMT that were allocated to Union City included trips that do not originate or terminate in the city. In other words, some portion of these "pass-through" trips and associated GHG emissions are allocated to the city, when they actually should be allocated to a different jurisdiction. A trip that originates in Oakland and travels to San Jose on Interstate 880 would pass through the City, and be recorded in the Caltrans Highway Performance Monitoring System database. If the raw VMT data were used to calculate the City's state highway emissions, these types of pass-through trips (i.e., VMT) and associated GHG emissions would be attributed to Union City, even though the city was neither the origin nor destination of this trip. Policies and measures developed as part of this CAP would have limited effect on emissions associated with pass-through trips.

To avoid including activities and emissions that cannot be affected by the CAP, a methodology was developed in consultation with MTC to separate the portion of locally-generated (i.e., within the city) state highway VMT from the city's baseline emissions inventory. This methodology is designed to omit pass-through highway trips from the baseline emissions inventory by determining the ratio of locally-generated highway VMT to total state highway VMT within the incorporated Union City. The analysis determined that approximately 34% of total state highway VMT in Union City was assumed to occur from trips internal to the incorporated area. The city's total 2005 state highway VMT (133,695,120 VMT/year) was multiplied by 34% to estimate the locally-generated state highway VMT that would contribute to the City's GHG emissions baseline (approximately 46,711,883 VMT/year). Under this adjusted baseline scenario, local roadway VMT in the city contributes 79.6% of total annual VMT, whereas internal state highway VMT contributes 20.4% of total annual VMT.

The $CO_2$ emissions associated with Union City's transportation sector were calculated using the California Air Resources Board's (ARB) Emission Factors model (EMFAC, 2007). EMFAC2007 can generate Alameda County-specific emission coefficients for vehicle fuel distribution, vehicle fuel efficiencies, and emission factors. Alameda County-specific EMFAC2007 data was only used for Community-wide transportation data. The Government-related vehicle fleet data provided by the City included fleet-specific information regarding fuel and vehicle types and, thus, included more specific information than Alameda County-wide assumptions. ICLEI's CACP software was used to generate emission factors for the specific government vehicle fleet.

Emission factors for $N_2O$ and $CH_4$ in units of grams per mile were obtained from the CCAR *General Reporting Protocol* Version 3.1 (CCAR, 2009[1]). The *General Reporting Protocol* provides $N_2O$ and $CH_4$ emission factors for gasoline- and diesel-fueled vehicles by vehicle class. The emission factors for

[1] California Climate Action Registry. 2009 (January). General Reporting Protocol Version 3.1. Los Angeles, CA.

gasoline and diesel vehicles were weighted using Alameda County-specific vehicle class population and distribution from EMFAC2007. Weighted $N_2O$ and $CH_4$ emission factors for gasoline and diesel vehicles were then multiplied by the projected 2020 VMT to calculate $N_2O$ and $CH_4$ emissions. Finally, $N_2O$ and $CH_4$ were weighted by their GWP and added to $CO_2$ emissions to obtain MT $CO_2e$.

### *Solid Waste Disposal*

GHG emissions associated with solid waste disposed by Union City residents and businesses were quantified using ICLEI's CACP software. The CACP software contains waste category-specific landfill emission factors. Tons of solid waste and alternative daily cover disposed of by Union City in 2005 was obtained from the California Integrated Waste Management Board's (CIWMB) Disposal Reporting System.[2] Waste categorization for City-disposed waste was obtained from the *Alameda County Waste Characterization Study 2000*[3] (StopWaste.Org, 2000).

The original ICLEI GHG inventory did not include emissions from wastewater treatment facilities and processes due to the complex nature of Union City's wastewater service providers. During AECOM's review of the inventory this issue was raised, but due to restraints in the project, the labor/data intensive nature of isolating Union City's wastewater activities, and the relatively small contribution of the wastewater sector, this sector was omitted from the inventory. However, Energy consumption from the USD facility is captured in the energy consumption data from PG&E used to calculate the energy sector emissions.

### *Water Consumption*

Water consumption by the City's residents and businesses require electricity for conveyance, treatment, and distribution. The water consumption data in 2005, provided in units of acre-feet per year for single-family residential, multi-family residential, commercial, industrial, and institutional land uses were obtained from the Alameda County Water District.

Electricity (i.e., kilowatts per million gallons) required to provide water for residential, commercial, and industrial uses was assumed to be similar because these land uses would be anticipated to require equal levels of water treatment. GHG emissions associated with water-related electricity consumption were calculated using California-wide emission factors from CCAR's *General Reporting Protocol* Version 3.1 (CCAR 2009[4]).

## Projected 2020 Business-As-Usual Emissions Inventory

The baseline inventory was used to project the City's 2020 GHG emissions assuming business-as-usual consumption trends continue. The projected 2020 inventory provides an emissions profile of Union City in 2020 if it were to continue on its current GHG-producing trends. Each emissions sector is projected based on consultation from City staff or appropriate indicators (e.g., population projections, historical trends). Bottom-up projections were not developed using exact planned development from the City's General Plan. Rather, the projected 2020 GHG emissions are based on applicable indicators for each emissions sector. This section describes the methodology used to project each emissions sector. See Table A-1 for a summary of the GHG emissions from this sector.

### *Energy Consumption*

In order to estimate GHG emissions associated with Union City's energy consumption in 2020, an annual average growth rate was applied to the 2005 baseline electricity and natural gas consumption data. The

[2] CIWMB is now the Department of Resource Recycling and Recovery, or CalRecycle.
[3] StopWaste.Org. 2000. Alameda County Waste Characterization Study 2000.
[4] California Climate Action Registry. 2009 (January). General Reporting Protocol Version 3.1. Los Angeles, CA.

U.S. Department of Energy (DOE) Energy Information Administration (EIA) publishes an annual Energy Outlook Report that forecasts electricity and natural gas consumption by land use type (i.e., residential, commercial, and industrial) for regions throughout the U.S. For Union City's 2020 energy projections, the Pacific region forecasts from the 2010 Annual Energy Outlook were used to calculate the annual average growth rate in electricity and natural gas consumption for residential, commercial, and industrial land uses (EIA 2010[5]). The same PG&E-specific emission factors used for the baseline year were also used to calculate 2020 energy-related GHG emissions. Although it is anticipated that PG&E and other utilities will continue to increase their renewable and zero-carbon electricity sources, it would be speculative to designate a 2020 electricity production emission factor.

### *Transportation*

Union City's 2020 local roadway and state highway VMT was projected using historical/projected Alameda County-specific vehicle travel data (e.g., VMT) from the MTC 2035 Regional Transportation Plan (MTC 2009[6]). An annual average VMT growth rate of 1.2% was calculated based on historical VMT data on roadways within Alameda County. This annual average growth rate was applied to the baseline local roads and state highway VMT to project 2020 VMT data. MTC is the regional agency responsible for transportation planning for Union City and therefore it is anticipated that the historical/projected MTC annual average growth rate would be the most applicable indicator for Union City.

Transportation-related $CO_2$, $CH_4$, and $N_2O$ emissions were calculated using similar methods as those described above for the baseline inventory. However, year 2020 parameters from EMFAC2007 were used to generate emission factors.

### *Solid Waste*

Union City's 2020 solid waste GHG emissions were projected using the growth rates of jobs and population from the Association of Bay Area Governments (ABAG) 2009 Projections as surrogates for the growth of commercial and residential land uses, respectively. The 2009 ABAG Projections are anticipated to be the most applicable and accurate indicator of the City's employment and population growth. Furthermore, in order to account for the relative contributions of residential and commercial land uses to the City's total solid waste disposal, the growth rates were weighted by the percent contribution to the City's total solid waste disposal by residential and commercial land uses, obtained from CalRecycle (CalRecycle 2010[7]). The weighted annual average growth rate was then applied to the baseline waste emissions to estimate 2020 solid waste-related GHG emissions.

### *Water Consumption*

Union City's projected 2020 water consumption was obtained from the Alameda County Water District. These forecasts represent the most informed projection of future water consumption in the City. The electricity requirements (i.e., kWh per million gallons of water) for residential, commercial, industrial, and institutional uses were calculated using the same methods as for the baseline inventory.

---

[5] Energy Information Administration. 2010. Annual Energy Outlook 2010: Supplemental Tables: Consumption & Prices by Sector & Census Division. Available at < http://www.eia.doe.gov/oiaf/aeo/supplement/supref.html>. Accessed February 20, 2010.
[6] Metropolitan Transportation Committee. 2009. Transportation 2035 Change in Motion.
[7] CalRecycle. 2010. Jurisdiction Profile Overview for City of Union City.

## Table A-1: Union City GHG 2005 Inventory and 2020 Projections

| Union City GHG Inventory: 2005 & 2020 (Projected) | | | | | | |
|---|---|---|---|---|---|---|
| **Sector** | **2005** | | **2020** | | **Change** | |
| | **MT $CO_2e$/yr** | **% of Total** | **MT $CO_2e$/yr** | **% of Total** | **MT $CO_2e$/yr** | **% Change** |
| **Buildings** | **183,689** | **53.6%** | **193,823** | **53.2%** | **10,129** | **5.5%** |
| *Residential* | *70,239* | *20.5%* | *79,517* | *21.8%* | *9,277* | *13.2%* |
| *Commercial & Industrial* | *113,454* | *33.1%* | *114,306* | *31.4%* | *852* | *0.8%* |
| **Transportation** | **126,984** | **37.1%** | **130,831** | **35.9%** | **3,847** | **3.0%** |
| *City Wide VMT* | *101,112* | *29.5%* | *104,176* | *28.6%* | *3,063* | *3.0%* |
| *State Highway VMT* | *25,872* | *7.6%* | *26,656* | *7.3%* | *784* | *3.0%* |
| **Waste** | **25,324** | **7.4%** | **31,873** | **8.8%** | **6,549** | **25.9%** |
| **Water** | **6,296** | **1.8%** | **7,716** | **2.1%** | **1,420** | **22.6%** |
| **Total** | **342,297** | **100.0%** | **364,243** | **100.0%** | **21,946** | **6.4%** |

*Note: figures may not add exactly due to rounding.*

# Appendix B: GHG Reductions

# Introduction

This appendix summarizes the assumptions and parameters used to calculate GHG emission reduction performance of CAP measures. The table below summarizes the GHG reductions generated by measures in the CAP. See Table B-1 at the end of the Appendix for a summary of the GHG reductions for each measure.

# GHG Reduction Analysis for CAP Measures

## Land Use Action Area (L)

### L-1: Transit-Oriented Development

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **L-1.1:** Continue supporting transit-oriented development in the Intermodal Station District and adjacent areas. | This measure estimates the reduction in transportation-related emissions resulting from locating 64% (approximately 2,438 units) of the city's future new development within the Intermodal Station District, a transit-oriented development district (TOD). Literature indicates that TOD can reduce residents' VMT by 12% to 25%. High quality TOD projects can achieve a reduction of 25%. The characteristics of the Intermodal Station District indicate that it will achieve a high level of VMT reduction. City planning staff and project documents indicate that approximately 2,438 residential units will be located within or directly adjacent to the Intermodal Station District (654 already built as of 2010). This represents 64% of the approximately 3,800 total units that are projected to be built in the city by 2020. | | | |
| | Annual VMT reduction of 15,644,605<br>(25% reduction in VMT associated with new development) | 64% of new growth located in TOD areas | 6,810 MT $CO_2e$/yr | *TOD VMT reduction performance: Transportation Research Board Special Report 298: Driving and the Built Environment: Effects of Compact Development on Motorized Travel, Energy Use, and CO2 Emissions, 2009, Washington DC http://books.nap.edu/openbook.php?record_id=12747&page=R2*<br>*Development projections: Union City Economic and Community Development Staff, 2010* |

### L-2: Mixed Use and Neighborhood Commercial Centers

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **L-2.1:** Enhance existing neighborhood-serving commercial centers in the city to increase residents' access to daily goods and services. | This measure estimates the reduction in transportation-related emissions resulting from locating 6% (approximately 230 units of the approximately 3,800 total units that are projected to be built in the city by 2020) of the city's future new development within mixed-use neighborhood commercial districts. Literature indicates that mixed-use neighborhood center development can reduce residents' VMT by 10%. City planning staff and project documents indicate that approximately 230 residential units could be located within mixed-use neighborhood centers. | | | |
| | Annual VMT reduction of 588,673<br>(10% reduction in VMT associated with new development) | 6% of new growth located in neighborhood commercial areas | 260 MT $CO_2e$/yr | *Mixed-use neighborhood center VMT reduction performance*<br>*Development projections: Union City Economic and Community Development Staff, 2010*<br>*Dagang, Deborah. 1995. Transportation impact factors: Quantifiable relationships. Victoria Transport Policy Institute. Victoria BC.* |

| L-3: Land Use Policies | |
|---|---|
| **Supporting Measures** | L-3.1: Ensure that City's policies, codes, standards, and design guidelines facilitate high quality mixed-use pedestrian- and transit-friendly land use patterns and development. |

## Transportation Action Area (T)

### T-1: Walking and Bicycling

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **T-1.1: Continue build-out (goal of 25% build-out), to the extent feasible, of the Pedestrian and Bicycle Master Plan by 2020.** | The vehicle miles traveled (VMT) reduction used in this calculation is based on calculations made in the Union City Pedestrian and Bicycle Master Plan (PBMP). The VMT reduction is based on the assumption that the infrastructure improvements called for in the PBMP will increase walking and bicycle travel mode share to level found in other East Bay cities with similar level of infrastructure (i.e., 2% bicycle mode share and 3.5% walking mode share). This increased mode share was translated into a reduction in single-occupancy automobile trip VMT. The City's bicycle infrastructure improvements would reduce VMT by 5,113,270 per year or 2% of total 2020 business-as-usual VMT. Walking infrastructure improvements would reduce VMT by 1,296,648 or 0.5% of total 2020 business-as-usual VMT.<br><br>City Staff estimated that due to economic constraints only 25% of the infrastructure described in the PBMP would be developed by 2020. For this reason only 25% of potential BPMP reductions were counted within the CAP.<br><br>Note: All VMT reductions applied to gasoline vehicle VMT only. Diesel VMT excluded due to the assumption that the vast majority of diesel VMT consists primarily of trucks and the CAP transportation and land use measures will not affect truck trips to a meaningful extent. | | | |
| | Annual VMT reduction<br><br>Bicycle: 1,278,318<br><br>Pedestrian: 324,162 | 25% of PBMP will be implemented by 2020 | Bicycle: 560 MT $CO_2e$/yr<br><br>Pedestrian: 140 MT $CO_2e$/yr<br><br>Total: 700 MT $CO_2e$/yr | *Performance: Union City Pedestrian and Bicycle Master Plan, 2008, Alta Planner,*<br><br>*Participation Rate: Union City, Economic and community Development Staff, 2010* |
| **Supporting Measure** | T-1.2: Work with New Haven Unified School District to maximize participation in Safe-Routes-to-School programs. | | | |

### T-2: Public Transit

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **T-2.1: Provide transit priority and express routes on Routes 1A, 1B, and 2 within the city.** | It is estimated that transit priority treatments in the Alvarado Niles and Whipple corridors have the potential to increase productivity for Routes 1A, 1B, and 2 by up to 20%, yielding an additional 72,800 transit trips per year in 2020. We estimate that of these, roughly 60% will be passengers who would have otherwise driven or been driven for their trip. Assuming an average trip length of four miles, these new transit trips would yield a reduction of approximately 175,000 VMT per year in avoided driving. | | | |
| | Annual VMT reduction: 174,788 | NA | 80 MT $CO_2e$/yr | *Ridership estimates: Nelson Nygaard, 2010* |

| | | | | |
|---|---|---|---|---|
| **T-2.2:** **Work with Union City Transit to continue the conversion of bus fleet to compressed natural gas.** | In 2009, UC Transit operated 39,636 vehicle revenue hours and consumed 90,765 gallons of diesel and 39,690 gallon equivalents of compressed natural gas (CNG). As a result of this level of consumption and fuel mix the 2009 UC Transit bus fleet generated 67.4 pounds $CO_2$ per revenue hour. This measure assumes that by 2020, 100% of the bus fleet will transition to CNG and vehicle revenue hours will increase to 40,948. The 2020 bus fleet will generate 54.9 pounds $CO_2$ per revenue hour or a 19% improvement over 2009 performance. The measure assumes that a gallon of diesel generates 22.4 pounds of $CO_2$ and a gallon equivalent of CNG generates 16.4 pounds of $CO_2$. | | | |
| | Percent reduction in GHG emissions per vehicle revenue hour: 19% | 100% of buses transition to CNG | 270 MT $CO_2e$/yr | *Vehicle revenue hours and fuel consumption data: Union City Transit, 2009*<br>*2020 projected vehicle revenue data: Union City Short Range Transit Plan, 2020* |
| **Supporting Measure** | T-2.3: Work with Union City Transit to improve ease of use of transit system. | | | |

## T-3: Transportation Demand Management

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **T-3.1:** **Increase participation by employers in transportation demand management programs.** | This measure assumes the following level of performance from each transportation demand management components. It is estimated that the enhanced rideshare program would yield a 3% reduction in auto commute trips. The telecommuting program would reduce auto commute trips by 2%. Subsidized transit passes at $40 per month program would reduce auto commute trips by 5%. Cumulatively the TDM program would achieve a 10% reduction in auto commute trips. These reductions were estimated by reviewing relevant TDM literature and case studies from existing TDM programs. | | | |
| | Annual VMT reduction of 1,259,955 | On average 17% of total Union City workers voluntarily participate in TDM programs | 540 MT $CO_2e$/yr | Auto commute trip reductions: Estimated by Nelson Nygaard, 2010 using sources cited below:<br>TDM program participation rate: Estimated by Nelson Nygaard, 2010 using sources cited below: |


*Bryon York and David Fabricatore, 2001, Puget Sound Vanpool Market Assessment, www.wsdot.wa.gov*

*Philip Winters and Daniel Rudge 1995 , Commute Alternatives Educational Outreach, www.cutr.eng.usf.edu*

*Reid Ewing, 1993, TDM, Growth Management, and the Other Four Out of Five Trips.*

*Alyssa Freas and Stuart Anderson, 1994, Effects of Variable Work Hour Programs on Ridesharing and Organizational Effectiveness, Transportation Research Record 1321*

*Reid Ewing, 1993, TDM, Growth Management, and the Other Four Out of Five Trips*

*Center for Urban Transportation Research, 1998, A Market-Based Approach to Cost-Effective Trip Reduction Program Design, http://ntl.bts.gov/lib/3000/3600/3633/cashdoc.pdf*

*Apogee, 1994, Costs and Cost Effectiveness of Transportation Control Measures; A Review and Analysis of the Literature, National Association of Regional Councils, www.narc.org*

*Amy Ho and Jakki Stewart , 1992, "Case Study on Impact of 4/40 Compressed Workweek Program on Trip Reduction," Transportation Research Record 1346, pp. 25-32*

*Genevieve Giuliano, 1995, "The Weakening Transportation-Land Use Connection, ACCESS, Vol. 6, University of California Transportation Center, Spring 1995, pp. 3-11*

*Santa Clara Valley Transportation Authority , 1997, Eco Pass Pilot Program Survey Summary*

*King County Metro, 2000, FlexPass: Excellence in Commute Reduction, Eight Years and Counting. www.commuterchallenge.org/cc/newsmar01_flexpass.html.*

*Christopher White, Jonathan Levine, and Moira Zellner ,2002, Impacts of an Employer-Based Transit Pass Program: The Go Pass in Ann Arbor, Michigan. www.apta.com/research/info/briefings/documents/white.pdf*

*Jeffrey Brown, Daniel Baldwin Hess, and Donald Shoup , 2003, Fare-Free Public Transit at Universities. http://shoup.bol.ucla.edu/FareFreePublicTransitAtUniversities.pdf*

*University of Washington Facilities Services, The U-PASS Online and Telephone Survey Report , 2006,* www.washington.edu/commuterservices/programs/upass/reports.php

*Comsis Corporation , 1993, Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience, USDOT and Institute of Transportation Engineers (www.ite.org); www.bts.gov/ntl/DOCS/474.html.*

*Victoria Transport Policy Institute , 2009, Trip Reduction Tables,* http://www.vtpi.org/tdm/tdm41.htm

*Victoria Transport Policy Institute , 2008, Transportation Elasticities, http://www.vtpi.org/elasticities.pdf*

| | |
|---|---|
| **Supporting Measure** | T-3.2: Enhance rideshare infrastructure to facilitate community participation. |

| **T-4: Transportation Policies** | |
|---|---|
| **Supporting Measure** | T-4.1: Ensure that City policies and budgetary processes facilitate a multi-modal transportation system within the community. |

## Buildings and Energy Action Area (E)

*Note: Quantitative energy savings data (in per square foot units) generated through the SSIMe building energy analysis is represented in italics in the "Performance" column. Additional information on this analysis is provided in Appendix D.*

**E-1: Residential Energy Efficiency Retrofits**

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **E-1.1:** **Develop an energy efficiency program that provides outreach, financing, and other forms of assistance to homeowners.** | Using the AECOM SSIMe™ Building Energy Analysis tool, a "basic" and "advanced" package of energy conservation measures was developed. The "basic" package corresponds to the lowest cost energy conservation measures, and generates an average energy savings of 15%. The "advanced" package was modeled to correspond to a 30% energy efficiency improvement. These emissions factors were used to calculate the GHG reduction. These packages correspond to the Energy Upgrade California program's "basic" and "advanced" packages. *See Appendix D for more details on the energy conservation packages.*<br><br>It should be noted that the energy efficiency improvements shown for each package do not directly translate to an equivalent GHG emissions reduction due to the different emission factors for electricity versus natural gas. See the Energy Consumption Section in Appendix A for more explanation of emission factors.<br><br>The energy efficiency retrofit program is designed to encourage homeowners to implement energy conservation measures. The GHG emission reductions were calculated based on the estimated participation rate for each of the aforementioned packages. | | | |
| | Basic Package: ~15% energy reduction<br><br>Advanced Package: ~30% energy reduction<br><br>*See Appendix D for more details on energy conservation packages* | 15% of Existing Residential Buildings by 2020 (10% Basic Package and 5% Advanced Package of ECMs) | 2,120 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |

## E-2: Household Appliances

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **E-2.1:** Work with PG&E to promote existing household appliance upgrades. | Energy efficient appliances generate GHG emissions reductions through decreasing the electricity demand of a given building. The appliances listed below all have an average energy savings compared to the typical conventional appliance. This energy savings was assumed and applied to the participating home and building owners to arrive at a total energy savings (kWh/yr). The participation rates for these various appliance upgrades is based on the average appliance life of 25 years, which results in 4% of all appliances being replaced each year. It was assumed that 25% of the total number of appliances replaced by 2020 are energy efficient. This was converted to MT CO2e using the emissions factors described in Appendix A for electricity. The absolute number of appliances was calculated based by applying these percentages to the number of residential homes in Union City in 2005 (19,650, ABAG), which does not count any new construction of homes through 2020. | | | |
| | Energy Savings<br>Refrigerator: 120 kWh/year<br>Dishwasher: 480 kWh/year<br>Clothes Washer: 540 kWh/year<br>Light bulbs (assumes 20 replacements per building): 640 kWh year | Refrigerators: 10%<br>Dishwashers: 10%<br>Clothes Washers: 10%<br>Light Bulbs: 50% | Refrigerators: 61 MT $CO_2e$/yr<br>Dishwashers: 243 MT $CO_2e$/yr<br>Clothes Washers: 274 MT $CO_2e$/yr<br>Light Bulbs: 1,622 MT $CO_2e$/yr<br>Total: 2,200 MT $CO_2e$/yr | *EPA ENERGY STAR*<br>*DOE*<br>*PG&E*<br>*ABAG* |

## E-3: Commercial Energy Efficiency Retrofits

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **E-3.1:** Develop an energy efficiency program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | Using the AECOM SSIMe™ Building Energy Analysis tool, a "basic" and "advanced" package of energy conservation measures was developed. The "basic" package corresponds to the lowest cost energy conservation measures, and generates a given energy savings. The package was modeled to correspond to the Alameda County Small Commercial Checklist and LEED-NC guidelines in the Green Building Standard. The "advanced package of energy conservation measures corresponds to the most cost-effective energy conservation measures. *See Appendix D for more details on the energy conservation packages.*<br>It should be noted that the energy efficiency improvements shown for each package do not directly translate to an equivalent GHG emissions reduction due to the different emission factors for electricity versus natural gas. See the Energy Consumption Section in Appendix A for more explanation of emission factors.<br>The energy efficiency retrofit program is designed to encourage building owners/users to implement energy conservation measures. The GHG emission reductions were calculated based on the estimated participation rate for each of the aforementioned packages. | | | |
| | Basic Package: 5% energy reduction<br>Advanced Package: 20% energy reduction<br>*See Appendix D for more details on energy conservation packages* | 15% of Existing Commercial and Industrial Buildings by 2020 (10% Basic Package and 5% Advanced Package of ECMs) | 1,450 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |

| | | | | |
|---|---|---|---|---|
| **E-3.2:** **Promote 'Cool Roofs' to mitigate the urban heat island effect and reduce air conditioning use** | Cool Roofs generate energy savings through reducing the cooling load (demand for air conditioning) of, in this case, commercial and retail buildings. On average, the GHG emission reductions from converting a typical black or grey roof is 5 MT $CO_2$e/yr for every 100 square meters converted.<br><br>The average life span of a roof is approximately 25 years, and based on this figure, approximately 40% of the roof space in Union City will turn over by 2020. The assumption for this measure was that 50 percent of the commercial and retail roof space would convert to cool roofs by 2020, given that the cost difference is small to negligible with the current PG&E rebates. | | | |
| | 5 MT $CO_2$e/yr per 100 square meters of roof conversion to "Cool Roof" technology | 20% of commercial and retail building roof space or ~1,000,000 square feet | 4,510 MT $CO_2$e/yr | *Lawrence Berkeley National Laboratory Urban Heat Island Group*<br>EPA<br><br>*Levinson, Akbari, Konopacki, and Bretz. 2002. Inclusion of Cool Roofs in Nonresidential Title 24 Prescriptive Requirements. Lawrence Berkeley National Laboratory.* |

## E-4: Building Performance Standards for New Construction

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2$e/year) | Sources |
|---|---|---|---|---|
| **E-4.1:** **Continue to implement the Green Building Ordinance.** | Measure E-4.1 captures the City's ongoing implementation of the Green Building Standard. The City's current Green Building Ordinance stipulates that new, residential projects must meet Build It Green's Green Point rated system; new, non-residential projects must meet Stopwaste.Org's Alameda County Small Commercial Green Building Checklist; and new, City-sponsored projects must achieve a Silver rating in the US Green Building Council's LEED-rating system. Each of these systems includes a requirement to achieve a specified energy efficiency benchmark. In the Green Point Rated standard, section J.1.a states that a residential project is required to "exceed Title 24 standards by a minimum of 15 percent". The Small Commercial Green Building Checklist requires that a project "exceed Title 24 standards by a minimum of 10 percent." The LEED-New Construction rating system contains a requirement within the Energy and Atmosphere section - EA Credit 1: Optimize Energy Performance, which offers two compliance pathways: Option 1 - Whole Building Energy Simulation or Option 2 - Prescriptive Compliance Path. Option 1 requires a minimum building energy performance of 12 percent better than ASHRAE Standard 90.1-2007, whereas Option 2 offers a prescriptive list of energy conservation measures, but no hard performance target.<br><br>It was assumed that new residential buildings would achieve a 15% increase in energy efficiency, and commercial buildings would achieve the minimum 10% energy efficiency improvement. These percentages were then applied equally to electricity and natural gas consumption across residential and commercial uses to calculate total anticipated emission reductions. | | | |
| | *Residential Buildings*: 15% reduction in combined electricity and natural gas consumption<br><br>*Non-Residential Buildings*: 10% reduction in combined electricity and natural gas consumption | 100% of all new construction | Residential: 1,390 MT $CO_2$e/yr<br><br>Non-Residential: 470 MT $CO_2$e/yr<br><br>Total: 1,860 MT $CO_2$e/yr | *AECOM SSIME™ Building Energy Analysis*<br><br>*California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings* |

## E-5: Smart Grid

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **E-5.1:** **Work with PG&E and other cities in Alameda County to accelerate Smart Grid integration in existing and new buildings.** | This measure would catalyze the City's integration into the "Smart Grid" system. This system would help the City manage and serve its electricity demand more efficiently in every demand scenario (e.g., peak and off-peak). The City's integration into the "Smart Grid" system is anticipated to reduce total electricity consumption from the residential and non-residential sectors by 6 percent and 8 percent, respectively. | | | |
| | *Residential Buildings*: 6% reduction in fossil fuel generated electricity<br>*Non-Residential Buildings*: 8% reduction in fossil fuel generated electricity | 100% of all existing and new buildings with smart-meters | 3,550 MT $CO_2e$/yr | *SMART 2020: Enabling the low carbon economy in the information age, The Climate Group on behalf of the Globale Sustainability Initiative (GeSI)*<br>*Estimating the Benefits of the GridWise Initiative Phase I Report Walter S. Baer, Brent Fulton, Sergej Mahnovski TR-160-PNNL, May 2004 Prepared for the Pacific Northwest National Laboratory PAGE 25* |

## E-6: Residential Hot Water Systems

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **E-6.1:** **Develop program to facilitate the installation of solar hot water heaters in existing and new residential development.** | Measures E-6.1 facilitates installation of solar hot water systems for residential land uses within Union City. The participation rates noted below are targets that represent the City's goals for solar hot water in residential uses.<br>For residential solar hot water systems, a bottom-up calculation was performed assuming that solar hot water heaters will supply approximately 70% of the energy required for water heating. The emission reductions were calculated by multiplying participation rates of existing and new residential buildings by the percent reduction in natural gas consumption for water heating. The avoided natural gas consumption calculations for solar hot water heating systems were based on the SSIMe building energy analysis calculations, which were tailored to prototypical building types in Union City (see Appendix D: Building Energy Analysis for more details). ). Note that it is assumed that basic energy efficiency measures are taken first, before the installation of the solar thermal system.<br>The energy reduction assumption for each building type was calculated using the incremental difference between the basic package of energy conservation measures and the inclusion of a solar hot water heating system. The residential percentage energy reduction improvement is higher for existing residential (34%) than new residential (32%) because of the fact that existing residential buildings have less efficient hot water heating systems than new buildings. | | | |
| | *Existing Residential*: 34% Reduction in Energy Consumption<br>*New Residential*: 32% Reduction in Natural Gas Reduction in Energy Consumption | 15% Existing Residential<br>20% New Residential | 4,170 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis*<br>*Energy Star. 2009. Solar Water Heater.* www.energystar.gov/ia/new_homes/features/WaterHtrs_062906.pdf<br>*Department of Energy. California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings*<br>*CEC source: CEC 2005. Electricity usage during Peak Periods. Available: www.energy.ca.gov/electricity/peak_loads.html* |

| E-7: Solar PV | | | | |
|---|---|---|---|---|
| **Measure** | **Performance** | **Participation Rate** | **GHG Reduction (MT $CO_2e$/year)** | **Sources** |
| **E-7.1 + E-7.2** | Measures E-7.1 and E-7.2 facilitates installation of solar photovoltaic (PV) systems for residential, commercial, and industrial land uses within Union City. The participation rates noted below are targets that represent the City's solar PV goals for residential and commercial/industrial uses.<br><br>The assumption for residential buildings was that the average PV installation size was 2-kW and for commercial buildings, the average PV installation size was 50-kW. The emission reductions were calculated by multiplying participation rates of existing and new buildings by the percent reduction in fossil fuel generated electricity. The avoided fossil fuel generated electricity calculations were based on the SSIMe building energy analysis calculations, which were tailored to prototypical building types in Union City (see Appendix D: Building Energy Analysis for more details). Note that it is assumed that basic energy efficiency measures are taken first, before the installation of PV.<br><br>The energy reduction assumption for each building type was calculated using the incremental difference between the basic package of energy conservation measures and the inclusion of a solar PV system. The residential percentage energy reduction improvement is higher for new residential (41%) than existing residential (35%) because of the fact that existing residential buildings have a higher energy demand than new buildings. Theoretically, the same holds true for commercial/industrial buildings. However, due to the fact that the distribution of existing commercial/industrial buildings does not reflect the composition of ne w construction, the overall energy demand by existing buildings (averaged over a highly varied building stock), appears to higher than the energy demand of new commercial/industrial buildings. This results in the percentage energy reduction for existing commercial/industrial buildings (24%) to be higher than that for new commercial/industrial buildings (21%). | | | |
| **E-7.1:** **Develop a solar PV program that provides outreach, financing, and other forms of assistance to homeowners.** | *Existing Residential*: 35% Reduction in Fossil Fuel Generated Electricity<br><br>*New Residential*: 41% Reduction in Fossil Fuel Generated Electricity | 10% Existing Residential<br><br>15% New Residential | 2,990 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |
| **E-7.2:** **Develop a solar PV program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners.** | *Existing Commercial and Industrial*: 24% Reduction in Fossil Fuel Generated Electricity<br><br>*New Commercial and Industrial*: 21% Reduction in Fossil Fuel Generated Electricity | 10% Existing Commercial and Industrial<br><br>15% New Commercial and Industrial | 2,910 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |
| **Supporting** | E-7.3: Develop "Solar Cities" style public outreach and education platform to promote solar PV systems. | | | |

## E-8: Wastewater Facility Energy Conservation and Reduction

| Measure | Installed Capacity | Completion Date | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| **E-8.1:** Explore opportunities to reduce energy consumption of wastewater facility through methane-to-energy production and solar photovoltaic installation. | For the Union Sanitary District (USD) 1-MW of methane-to-energy system, the avoided fossil fuel energy consumption was calculated and the carbon emission factor applied to estimate the GHG emission reduction. The GHG reductions quantified as part of this measure are associated with reductions achieved from the proposed methane-to-energy facility plant. Although it is anticipated that the other components of the measure would achieve GHG reductions, those reductions cannot be accurately quantified at this time. It is anticipated that the methane-to-energy facility would reduce electricity consumption emissions through the use of methane (CH4) rather than the current electricity production portfolio. Assuming that the methane-to-energy facility runs at an average from 30 to 50 percent capacity year round, the annual kWh produced is approximately 3.5 million. The kWh produced was converted to a GHG reduction using conversion factors for methane and the displaced energy from the electric grid. Electricity emissions saved subtracted by the methane combustion emissions is equal to the total savings for methane-to-energy system. It should be noted that the natural gas needed to run the facility was not included in the calculation. Especially in winter, the natural gas demand could be significant.<br><br>For USD facility 150-kW PV system, a bottom-up calculation was performed assuming a system efficiency of 10 watts per square foot and solar irradiance of 21.6 kilowatt-hours per square foot per year (SolarEstimate 2010) (assuming an average of 6 hours of operation per day per year). Emission reductions associated with commercial/industrial PV systems were calculated using the electricity consumption emission factor. | | | |
| | 1-MW methane-to-energy<br><br>150-kW of solar photovoltaic | By 2015 | 1-MW Methane-to-energy: 484 MT $CO_2e$/yr<br><br>150-kW Solar PV: 72 MT $CO_2e$/yr<br><br>Total: 560 MT $CO_2e$/yr (rounded) | *DOE*<br><br>*PG&E*<br><br>*California Solar Initiative*<br><br>*CCAR General Reporting Protocol Version 3.1 (Table C.2)* |

## Optional Measures

| Measure | Performance | Participation Rate | GHG Reduction (MT $CO_2e$/year) | Sources |
|---|---|---|---|---|
| ***Optional Measure 1:*** Amend Green Building Ordinance to include an energy performance standard for major additions and remodels. | This measure requires the City to adopt an energy efficiency ordinance that requires all major residential remodels or additions to achieve a 15 percent improvement in energy efficiency. This 15% increase in energy efficiency was then applied equally to electricity and natural gas consumption (i.e., 7.5% for electricity and 7.5% for natural gas) across residential remodels and major additions to calculate total anticipated emission reductions. | | | |
| | Basic Package: ~15% energy reduction<br><br>*See Appendix D for more details on energy conservation packages* | 100% of Existing Residential Buildings that undergo a major remodel or addition by 2020 (between 2 and 5% of the total existing building stock) | 620-1,240 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |

| | | | | |
|---|---|---|---|---|
| ***Optional Measure 2:*** **Require all new non-residential construction to achieve California Green Building Code Tier I Energy Efficiency Standards (Section A5.203.1.1).** | This measure requires the City to adopt an energy efficiency ordinance that requires all new non-residential buildings to achieve the California Green Building Code Tier I Energy Efficiency Standard (15% above Title 24 Standards). This is only a marginal change from the standards that currently exist in the Green Building Ordinance. This 15% increase in energy efficiency was then applied equally to electricity and natural gas consumption (i.e., 7.5% for electricity and 7.5% for natural gas) across all non-residential uses to calculate total anticipated emission reductions. The implementation time will impact the GHG reductions achieved. | | | |
| | *Non-Residential Buildings*: 15% reduction in fossil fuel generated energy | 100% of all new non-residential construction | 220-440 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis*<br>*California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings* |
| ***Optional Measure 3:*** **Adopt a Residential Energy Conservation Ordinance (RECO) to require energy efficiency retrofits for point-of-sale and major renovations.** | Using the AECOM SSIMe™ Building Energy Analysis tool, an "advanced" package of energy conservation measures was developed. The "advanced" package was modeled to correspond to a 25% energy efficiency improvement. These emissions factors were used to calculate the GHG reduction. *See Appendix D for more details on the energy conservation packages.*<br>It should be noted that the energy efficiency improvements shown for each package do not directly translate to an equivalent GHG emissions reduction due to the different emission factors for electricity versus natural gas. See the Energy Consumption Section in Appendix A for more explanation of emission factors.<br>The RECO program is designed to trigger an energy efficiency retrofit at point-of-sale. The participation rates were developed based on the historic turnover of homes from 2000-2009, and were extrapolated to 2020. Ultimately, the percentage of existing homes that undergo an energy efficiency retrofit will be largely dependent on the time of implementation. | | | |
| | Advanced Package: ~25% energy reduction<br>*See Appendix D for more details on energy conservation packages* | 20-35% of Existing Residential Buildings by 2020 | 3,990-6,980 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |
| ***Optional Measure 4:*** **Adopt a Commercial Energy Conservation Ordinance (CECO) to require energy efficiency retrofits for point-of-sale and major renovations.** | Using the AECOM SSIMe™ Building Energy Analysis tool, an "advanced" package of energy conservation measures was developed. The "advanced" package was modeled to correspond to a 25% energy efficiency improvement. These emissions factors were used to calculate the GHG reduction. *See Appendix D for more details on the energy conservation packages.*<br>It should be noted that the energy efficiency improvements shown for each package do not directly translate to an equivalent GHG emissions reduction due to the different emission factors for electricity versus natural gas. See the Energy Consumption Section in Appendix A for more explanation of emission factors.<br>The CECO program is designed to trigger an energy efficiency retrofit at point-of-sale. The participation rates were developed based on the historic turnover of non-residential buildings, which is typically 20 years, and were extrapolated to 2020. Ultimately, the percentage of existing homes that undergo an energy efficiency retrofit will be largely dependent on the time of implementation. | | | |
| | Advanced Package: ~25% energy reduction<br>*See Appendix D for more details on energy conservation packages* | 20-40% of Existing Commercial Buildings by 2020 | 6,570-13,140 MT $CO_2e$/yr | *AECOM SSIMe™ Building Energy Analysis* |

## Waste Diversion and Reduction Action Area (WR)

| WR-1: Waste Reduction Policies | | | | |
|---|---|---|---|---|
| **Measure** | **Performance** | **Participation Rate** | **GHG Reduction (MT $CO_2e$/year)** | **Sources** |
| **WR-1.1:** Establish 90% waste reduction interim target for 2020. | This measure assumes a 90 percent reduction in landfill waste by 2020. The baseline waste diversion rate was 62 percent in 2005 (the diversion rate in 2010 is approximately 75 percent). This measure would apply to GHG emissions associated with new waste generated only and would not apply to waste in place. | | | |
| | 90% waste diversion rate by 2020 | N/A | Residential<br>5,230 MT $CO_2e$/yr in 2020<br>Commercial<br>3,690 MT $CO_2e$/yr in 2020<br>Total<br>8,920 MT $CO_2e$/yr in 2020 | *ICLEI 2005 GHG Inventory for Union City*<br>*ABAG 2009 Projections*<br>*CalRecycle* |
| **Supporting Measures** | WR-1.2: Strengthen C&D Ordinance to require 75% of debris to be recycled or reused.<br>WR-2.1: Continue to partner with StopWaste.org to improve technical assistance + financial.<br>WR-3.1: Work with StopWaste.org to expand outreach programs and incentivize waste reduction.<br>WR-3.2: Identify key sites/events for "Recycle on the Go" Infrastructure and implement program.<br>WR-4.1: Continue to work to urge adoption of legislation that requires extended producer responsibility.<br>WR-5.1: Increase waste reduction in municipal facilities and enhance implementation of EPP program. | | | |

## Water Conservation Action Area (WC)

| WC-1: Water Conservation Policies | | | | |
|---|---|---|---|---|
| **Measure** | **Performance** | **Participation Rate** | **GHG Reduction (MT $CO_2e$/year)** | **Sources** |
| **WC-1.X:** SB 7 Urban Water Consumption Reductions | In order to estimate the GHG reductions associated with implementation of SB 7, water consumption data for 2005 and 2020 provided by Alameda County Water District (ACWD) were used as baseline estimates. Year 2005 urban water consumption from ACWD was used to calculate a baseline per capita water consumption based on ABAG 2009 population data for Union City. SB 7 requires a reduction in per capita water consumption by 2020 - either the "standard target", a 20 percent reduction from the average water demand between 1994 and 2004, or the "alternative minimum", a 5 percent reduction from the average water demand between 2003 and 2007. ACWD has yet to determine the specific SB 7 target that it will attempt to achieve, and, therefore, there is uncertainty in developing guidelines for ACWD's compliance. However, for the purposes of the CAP, it was assumed that the "standard target" was chosen, which translates into approximately a 13 percent reduction below 2005 levels due to the fact that the average water demand between 1994 and 2004 is 7 percent less than the water demand in 2005. This 13 percent reduction from the baseline (2005) per capita water consumption rate and the ABAG projected 2020 population was used to calculate the target water consumption in 2020. The target water consumption was subtracted from the ACWD projected 2020 urban water consumption to calculate the annual water savings achieved in year 2020. Similar to the methods used to calculate water-related GHG emissions for the inventory, the annual water savings were used to calculate the amount of electricity consumption and GHG emissions (associated with conveyance, distribution, and treatment of the water) that would be reduced as a result of SB 7. Estimated Reduction: 880 MT $CO_2e$/yr.<br>*WC-1.X represents an alternative calculation to the combined reductions in WC-1.1, WC-1.2, and WC-2.1. These measures represent a road map to achieve the SB 7 target. The overall GHG reduction achieved by these three measures, as currently designed is approximately equivalent to attaining the "standard target" for SB 7.* | | | |

| | | | | |
|---|---|---|---|---|
| **WC-1.1:** **Water Efficient Landscape Ordinance** | The water-efficient landscape ordinance would require new landscape projects and irrigation systems to reduce outdoor water consumption by 50 percent beyond the initial requirements for plant installation and establishment. This measure would be applicable to GHG emissions associated with outdoor water consumption by new development (i.e., 860 MT $CO_2e$ in 2020). There is approximately 1.98 MT $CO_2e$/yr generated per million gallons (MG) of water provided by ACWD. | | | |
| | 50% reduction in water use for landscape irrigation | 100% of landscapes that require irrigation from new development | 290 MT $CO_2e$/yr<br>Approximately 147 MG of water saved | Department of Water Resources. 2001. Statewide Indoor/Outdoor Split. Accessed December 2, 2008. Available at: www.landwateruse.water.ca.gov/annualdata/urbanwateruse/2001/landuselevels.cfm?use=8. |
| **WC-1.2:** **Indoor and Outdoor Non-potable Water Systems Program** | The Indoor Recycled Water and Outdoor Rainwater Systems Program will encourage home and building owners to install systems that utilize recycled water, such as toilets. Additionally, the rainwater collection component to the program will encourage the use of rainwater for outdoor watering and irrigation. The average reduction in potable water consumption (based on internal water modeling done by AECOM) was applied to the expected participation rate to arrive at an overall reduction in potable water consumption. This number was converted into MT $CO_2e$/yr by using the water-related emissions factors described in Appendix A. See WC-1.1 for the carbon emissions factor for water consumption by ACWD. | | | |
| | 25% reduction in water use for indoor applications<br>30% reduction in water use for outdoor applications | Indoor - 10% of residential homes by 2020<br>Outdoor - 30% of residential homes by 2020 | 140 MT $CO_2e$/yr<br>100 MT $CO_2e$/yr<br>Total of 240 MT $CO_2e$/yr<br>Approximately 121 MG of water saved | *California Urban Water Conservation Council*<br>*EPA*<br>*Graywater.org*<br>*AECOM* |

| WC-2: Water Conservation Public Outreach and Consumer Education Programs | | | | |
|---|---|---|---|---|
| **Measure** | **Performance** | **Participation Rate** | **GHG Reduction (MT $CO_2e$/year)** | **Sources** |
| **WC-2.1:** **Work with ACWD to expand outreach programs and incentivize water conservation throughout Union City.** | The average water efficiency improvement through the implementation of water conservation measures was applied to the estimated participation rate to arrive at an overall reduction in potable water consumption. This number was converted into MT $CO_2e$/yr by using the water-related emissions factors described in Appendix A.<br>This participation rate in this measure represents an aspirational target that the CAP will need to achieve in order to meet the SB 7 requirement of a 13% reduction in urban water consumption (see WC-1.X). See WC-1.1 for the carbon emissions factor for water consumption by ACWD. | | | |
| | 20% reduction in water use for indoor applications | 25% of all home and building owners | 350 MT $CO_2e$/yr<br>Approximately 177 MG of water saved | *California Urban Water Conservation Council*<br>*AECOM* |
| **Supporting Measures**<br>***Non-quantifiable measures in italics*** | WC-1.4: Work with Alameda County Water District to consider "Conservation Pricing".<br>WC-2.2: Become a member in existing water conservation and outreach programs.<br>WC-3.1: Identify potential demonstration projects for low-impact development (LID)<br>*WC-4.1: Implement water conservation programs in City-operated facilities.* | | | |

| Water Conservation Optional Measure | | | | |
|---|---|---|---|---|
| **Measure** | **Performance** | **Participation Rate** | **GHG Reduction (MT $CO_2e$/year)** | **Sources** |
| ***Optional*** | The Residential Water Conservation Ordinance program is designed to trigger an water efficiency retrofit at point-of-sale. An estimated 20% reduction in water use could be achieved through a combination of installing high efficiency water fixtures and fittings, as well as implementing landscape irrigation reduction measures. The participation rates were developed based on the historic turnover of residential buildings from 2000 to | | | |

| | | | | |
|---|---|---|---|---|
| **Measure 5:** Residential Water Conservation Ordinance | 2009, and were extrapolated to 2020. Ultimately, the percentage of existing homes that undergo an energy efficiency retrofit will be largely dependent on the time of implementation. | | | |
| | 20% reduction in water use for indoor applications | 20-35% of all home and building owners | 220-380 MT $CO_2e$/yr<br>Approximately 111-192 MG of water saved | *California Urban Water Conservation Council*<br>*AECOM* |

## Green Infrastructure Action Area (GI)

| GI-1: Carbon Sequestration | | | | |
|---|---|---|---|---|
| **Measure** | **Performance** | **Participation Rate** | **GHG Reduction (MT $CO_2e$/year)** | **Sources** |
| **GI-1.1:** Expand the urban forest in order to sequester carbon and reduce building energy consumption. | This measure is based on extrapolating the carbon sequestration potential of a typical tree palette across the public tree planting goals (5,000 trees planted on public land within rights-of-way in the city by 2020). Carbon sequestration rates specific to the species and age of the planted trees were used calculate the annual sequestration potential of the trees from 2010 to 2020. | | | |
| | N/A | 5,000 additional trees planted (net of tree planting and tree removal) | 1,600 MT $CO_2e$/yr in 2020 | The Center for Urban Forest Research Tree Carbon Calculator.<br>California Energy Commission [CEC] 2005. Electricity Usage During Peak Periods.<br>California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings |
| **Supporting Measures** | GI-1.2: Expand or restore natural habitat areas in the city where possible.<br>GI-1.3: Include carbon sequestration as an objective within City-led natural area restoration projects.<br>GI-2.1: Continue and expand the existing local community garden program<br>GI-3.1: Identify educational demonstration projects for Bay Friendly Landscaping Projects. | | | |

## Table B-1: Summary of GHG Reduction Measures and Associated Reductions*

| | | |
|---|---|---|
| **LAND USE ACTION AREA** | | **7,070 MT $CO_2e$/yr** |
| **LU-1.1** | Continue supporting transit-oriented development in the Intermodal Station District and adjacent areas. | 6,810 MT $CO_2e$/yr |
| **LU-2.1** | Enhance existing neighborhood-serving commercial centers in the city. | 260 MT $CO_2e$/yr |
| **TRANSPORTATION ACTION AREA** | | **1,590 MT $CO_2e$/yr** |
| **T-1.1** | Continue build-out (goal of 25% build-out), to the extent feasible, of the Pedestrian and Bicycle Master Plan by 2020. | 700 MT $CO_2e$/yr |
| **T-2.1** | Provide transit priority and express routes on the Alvarado-Niles and Whipple corridors. | 80 MT $CO_2e$/yr |
| **T-2.2** | Convert bus fleet to compressed natural gas or hybrid vehicles. | 270 MT $CO_2e$/yr |
| **T-3.1** | Increase participation by employers in transportation demand management programs. | 540 MT $CO_2e$/yr |
| **BUILDINGS AND ENERGY ACTION AREA** | | **26,320 MT $CO_2e$/yr** |
| **E-1.1** | Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to homeowners. | 2,120 MT $CO_2e$/yr |
| **E-2.1** | Work with PG&E to promote existing household appliance upgrades. | 2,200 MT $CO_2e$/yr |
| **E-3.1** | Develop a comprehensive energy efficiency program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | 1,450 MT $CO_2e$/yr |
| **E-3.2** | Promote 'Cool Roofs'. | 4,510 MT $CO_2e$/yr |
| **E-4.1** | Continue implementing the Green Building Ordinance. | 1,860 MT $CO_2e$/yr |
| **E-5.1** | Work to accelerate Smart Grid integration in existing and new buildings. | 3,550 MT $CO_2e$/yr |
| **E-6.1** | Develop program to facilitate the installation of solar hot water heaters in homes. | 4,170 MT $CO_2e$/yr |
| **E-7.1** | Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to homeowners. | 2,990 MT $CO_2e$/yr |
| **E-7.2** | Develop a comprehensive solar PV program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | 2,910 MT $CO_2e$/yr |
| **E-8.1** | Explore opportunities to reduce energy consumption of wastewater facility through methane-to-energy production, as well as solar PV installation. | 560 MT $CO_2e$/yr |
| **WASTE REDUCTION ACTION AREA** | | **8,920 MT $CO_2e$/yr** |
| **WR-1.1** | Increase Waste Diversion Target to 90 percent. | 8,920 MT $CO_2e$/yr |
| **WATER CONSERVATION ACTION AREA** | | **880 MT $CO_2e$/yr** |
| **WC-1.1** | Water Efficient Landscape Ordinance. | 290 MT $CO_2e$/yr |
| **WC-1.2** | Indoor and Outdoor Non-potable Water Systems Program. | 240 MT $CO_2e$/yr |
| **WC-2.1** | Work with Alameda County Water District to expand outreach programs and incentivize water conservation throughout Union City. | 350 MT $CO_2e$/yr |
| **GREEN INFRASTRUCTURE ACTION AREA** | | **1,600 MT $CO_2e$/yr** |
| **GI-1.1** | Expand the urban forest to sequester carbon and reduce building energy consumption. | 1,600 MT $CO_2e$/yr |
| **STATE LEVEL REDUCTIONS** | | **53,680 MT $CO_2e$/yr** |
| **TOTAL GHG REDUCTIONS** | | **100,060 MT $CO_2e$/yr (22.8% below 2005 levels in 2020)** |

** Does not include supporting measures*

This page was intentional left blank.

# Appendix C: Economics

## Introduction

Economics were a key consideration in determining the feasibility of proposed GHG reduction measures. Cost to the City, as well as costs and savings to the resident or property owner were assessed as part of this analysis for each GHG reduction measure. These costs and savings were categorized into very low, low, medium, and high using the ranges provided in Table C-1.

## Costs & Savings

The City is not the only entity bearing financial responsibility for implementing for CAP measures; there will be a private cost borne by residents and businesses for some measures. In recognition of this, a costs and savings analysis was performed for each measure, which evaluated the cost to City, as well as potential costs and savings to residents or property owners. Measures vary in the distribution of costs; some measures require only funding from the City or other public entities, whereas others require that residents and businesses contribute. In nearly all measures that require some investment by residents or business owners there are substantial long-term savings that will allow recuperation of initial investments, as well as other benefits such as improved air quality or public realm (e.g., streetscapes, open spaces, rights-of-way, etc.). There are also measures that require no private investment, but generate savings for the resident or business owner.

### Cost to City

For the City, the economic implications of implementing the CAP's GHG reduction measures primarily concern capital costs, program implementation costs, and employee costs. Measures were assessed for their initial implementation costs, which typically included administration costs for new programs and initial capital investments for any infrastructure or program development related costs. Costs are not represented as additional costs to the City, and rather were assessed on a measure-by-measure basis. Consequently, there may be substantial cost savings to the City in implementing the CAP internally, if current staff and resources are utilized. While some measures require funding of capital costs or program costs, other measures necessitate the hire of sustainability professionals. Recommendations are presented for additional staff needs to implement the CAP at the end of each Action Area. These estimates are highly negotiable, depending on the level of internal staff capacity to implement the CAP.

Though some GHG reduction measures may generate savings for the City, this was not analyzed due to the uncertain program design details of revenue generating measures, as well as the speculative nature of the impact of some measures on the property tax base. It should be recognized, however, that for measures that will generate a demonstrable increase in property values due to, for instance, energy or water efficiency retrofits, the City would stand to benefit from corresponding property tax increases. Other measures could have a positive financial impact on the City, such as land use and transportation measures that improve the public realm in and around business districts. There is ample evidence that shows that an enhanced public realm results in better business for retail, which would result in increased taxable sales for the City. These savings were not captured in this analysis, though they should be considered when implementing relevant measures.

### Cost to Resident or Business

Although many GHG reduction measures do not result in any notable private costs, the economic implications of some measures to the resident or property owner merit analysis and quantification, where possible. The cost analysis for residents or property owners was framed in terms of annual costs (or average annual costs). While several measures have costs that are mandatory (i.e. Water Efficient Landscape Ordinance),

whereas others are voluntary (i.e., water efficiency retrofits). However, there are funding sources and financing mechanisms available to help offset private costs. In order to provide a comparable assessment of costs, the calculations were based on a hypothetical average resident or business. For nearly every measure with private cost implications, there are savings that would accrue over time, defraying some of the initial investment.

### Savings to Resident or Business

The savings analysis for residents or property owners was also framed in terms of annual savings, as many savings would be recurring. Not all measures generate savings, though many that deal with energy or water efficiency in the home or business generate long-term utility bill reductions. Even transportation measures can generate savings through decreased frequency of car travel. In order to provide a comparable assessment of savings, the calculations were based on a hypothetical average resident or business.

## Building Energy Economics

Recognizing the importance of effectively assessing the potential improvement that can be made in building energy performance, the consultants (AECOM) used a building energy analytical approach called – SSIMe CAP to evaluate the energy savings (percent reduction from baseline building), initial capital cost ($/square foot), and annual energy cost savings ($/square foot/year) of specified energy conservation measures and packages of measures. SSIMe CAP is a member of AECOM's proprietary SSIM™ (Sustainable Systems Integrated Modeling) suite and has been developed to facilitate the evaluation of various energy conservation measures for different building types within the community. The SSIMe CAP process combines credible data from the Residential Energy Consumption Survey (RECS) and California Commercial End-Use Study (CEUS) with local climate, energy consumption, and cost calibration to ensure that an accurate assessment is made of both the energy demand and the potential savings that could be achieved. See Appendix C for additional explanation of the SSIMe building energy analysis process. For the Buildings and Energy Action Area, private costs and savings were calculated and represented quantitatively, and categorized into very low, low, medium, and high using the ranges provided in Table C-2.

*Table C-1: Measure Cost Type, Category, and Ranges*

| Type | Costs and Savings Range |
|---|---|
| **Cost to City** | *Very Low*: Below $10,000<br>*Low*: $10,001 - $20,000<br>*Medium*: $20,001 - $100,000<br>*High*: Greater than $100,000 |
| **Cost to Resident or Business** | *Very Low*: Below $100<br>*Low*: $101 - $200<br>*Medium*: $201 - $1,000<br>*High*: Greater than $1,000 |
| **Savings to Resident or Business** | *Very Low*: Below $25/year<br>*Low*: $26/year - $50/year<br>*Medium*: $51/year - $250/year<br>*High*: Greater than $250/year |

*Table C-2: Measure Cost Type, Category, and Ranges*

| Type | Costs and Savings Range | Payback Range |
|---|---|---|
| **Cost to Resident or Business** | *Very Low*: Below $1.00/sf/year<br>*Low*: Between $1.01 - $5.00/sf/year<br>*Medium*: Between $5.01 - $10.00/sf/year<br>*High*: Greater than $10.00/sf/year | *Very Short*: ~0 - ~5 years<br>*Short*: ~6 - ~10 years<br>*Medium*: ~11 - ~15 years<br>*Long*: Greater than ~16 years |
| **Savings to Resident or Business** | *Very Low*: Below $0.10/sf/year<br>*Low*: $0.11 - $0.25/sf/year<br>*Medium*: $0.26 - $1.00/sf/year<br>*High*: Greater than $1.00/sf/year | |

## Funding Sources & Financing Mechanisms

Another major consideration in determining the optimal mix of effective GHG reduction measures was the availability of funding sources and financing mechanisms that Alameda County could pursue to offset the financial burden of implementation. Table B-3 provides a summary of the funding sources and financing mechanisms assessed as part of this CAP. This list may not represent a comprehensive assessment of potential options, but characterizes the majority of available funding sources and financing mechanisms. Descriptions of each funding source or financing mechanism can be found in Part 4: Implementation, and a measure-specific assessment of how these resources can be applied is included in Costs and Savings Matrix (deciphered using the key provided in Table B-3).

The spectrum of public and private funding options for the measures outlined in this CAP is ever evolving. This section outlines current viable funding options, as of the date of the CAP preparation, but there will eventually become out of date. However, there are general sources of funding that can be drawn upon to obtain the most up-to-date information possible. More details on these resources are noted in the introduction to Part 4: Implementation.

*Table B-3: Funding Source and Financing Mechanism Key*

| Funding Sources and Financing Mechanisms | Key |
|---|---|
| **Transportation-related Incentives and Programs** | **A** |
| Transportation Fund for Clean Air | A.1 |
| Safe Routes for Transit | A.2 |
| MTC Livable Communities & Housing Incentive Program | A.3 |
| MTC Transit Oriented Development Policy | A.4 |
| Safe Routes to School | A.5 |
| Alameda County Transportation Improvement: Caltrans Planning Grants | A.6 |
| **Energy-related Incentives and Programs** | **B** |
| Energy Upgrade California | B.1 |

| | |
|---|---|
| Flex Your Power | B.2 |
| California Solar Initiative | B.3 |
| California Feed-In Tariff | B.4 |
| Property Assessed Clean Energy (PACE) | B.5 |
| California Energy Commission Energy Efficiency Financing | B.6 |
| School Facility Program – Modernization Grants | B.7 |
| Infrastructure State Revolving Fund Program | B.8 |
| CPUC Self Generation Incentive Program | B.9 |
| **Energy-related Bond Financing** | **C** |
| Qualified Energy Conservation Bonds (QECBs) | C.1 |
| Clean Renewable Energy Bonds (CREBs) | C.2 |
| **Other Climate Change-related Programs** | **D** |
| CAL FIRE Climate Change Program | D.1 |
| Climate Corps Bay Area | D.2 |
| Alameda County Water District Business Programs | D.3 |
| Alameda County Water District Residential Programs | D.4 |
| **Partnerships with Private Companies and Other Organizations** | **E** |
| Power Purchase Agreements (PPAs) | E.1 |
| Energy Savings Performance Contracting (ESPC) | E.2 |
| Energy Efficiency Mortgages | E.3 |
| **Partnerships with Other Jurisdictions and Organizations** | **F** |
| Metropolitan Transportation Commission (MTC) | F.1 |
| Association of Bay Area Governments (ABAG) | F.2 |
| Pacific Gas & Electric (PG&E) | F.3 |
| Alameda County Water District (ACWD) | F.4 |
| Union Sanitary District (USD) | F.5 |
| Transform | F.6 |
| Alameda County Transit (AC Transit) | F.7 |
| Stopwaste.org | F.8 |
| East Bay Bicycle Coalition | F.9 |
| Build It Green | F.10 |
| Local Communities | F.11 |
| **City Funds** | **G** |
| Special Revenue Fund | G.1 |
| Redevelopment Funds | G.2 |
| General Funds | G.3 |
| **Self-Financing Strategies** | **H** |

# Economic Assumptions and Sources for GHG Reduction Measures

## Land Use Action Area (L)

### L-1: Transit-Oriented Development

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **L-1.1:** Continue supporting transit-oriented development in the Intermodal Station District and adjacent areas. | Cost to City | High | − Cost of creating an infrastructure investment program that identifies and implements basic infrastructure improvements needed to attract TOD developers. | *SOURCES*<br><br>*FUNDING & FINANCING*<br>*A.3, A.4, G.2, F.1, F.6* |
| | Private Cost | N/A | | |
| | Private Savings | Low | − Increased access to public transit<br>− See T-1.1 and T-1.2 for estimates of the savings related to reducing vehicle trips. | *SOURCES*<br>*AECOM* |

### L-2: Mixed Use and Neighborhood Commercial Centers

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **L-2.1:** Enhance existing neighborhood-serving commercial centers in the city to increase resident access to daily goods and services. | Cost to City | Med | − Cost of conducting a land use and market analyses to identify sites within residential areas of the city that could support new or expanded neighborhood commercial centers. Estimated at between $40,000 and $60,000. | *SOURCES*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*A.3, F.1, F.6* |
| | Private Cost | N/A | | |
| | Private Savings | Low | − See T-1.1 and T-1.2 for estimates of the savings related to reducing vehicle trips. | *SOURCES*<br>*AECOM* |

### L-3: Land Use Policies

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **L-3.1:** Ensure that City policies, codes, standards, and design guidelines facilitate high quality mixed-use pedestrian- and transit-friendly land use patterns and development. | Cost to City | Med | − Cost of conducting a comprehensive evaluation of the City's zoning ordinances, subdivision regulations, street standards, development standards, design guidelines, to identify policies that act as regulatory barriers to desired forms of climate-friendly, compact development. Estimated at between $60,000 and $80,000.<br>− Cost of exploring the option of smart growth incentive programs such as a density bonus estimated at ~$10,000-$20,000. | *SOURCES*<br>*AECOM*<br>*Nelson Nygaard* |
| | Private Cost | N/A | | |
| | Private Savings | N/A | | |

| Staffing Needs to Implement Measures in Land Use Action Area | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources** |
| **L-Staff** | **Cost to City** | **Low - Med** | – Staff resources necessary to implement all measures in Land Use Action Area: ~0.10 - 0.20 FTE, assuming that 1 FTE requires $150,000/yr, which includes salary + benefits (based on FY 2010-11). | *SOURCES*<br>*AECOM* |

## Transportation Action Area (T)

| T-1: Walking and Bicycling | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources & Funding** |
| **T-1.1a:** Continue build-out (goal of 25% build-out), to the extent feasible, of the Bicycle Master Plan by 2020. | **Cost to City** | **High** | – There can be some variations in cost depending on project needs.<br>– Class I Path Construction - $550K/mile (high end indicates grade-separated crossings every 1 to 2 miles)<br>– Class II Bike Lanes - $30K/mile (could be more if it requires road widening and right of way acquisition)<br>– Class III Bike Routes - $10K/mile (depends on level of treatment: route signage only would be low end, signage and shoulder striping, pavement markings, signal actuation would be higher end).<br>– Assumed between 2 and 6 miles of both Bike Lanes and Bike Routes for 50% build-out of plan | *SOURCES*<br>*Union City Bicycle and Pedestrian Master Plan 2006*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*A.2, A.3, F.1, F.6, F.9* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **Very Low** | – In 2008, the number of daily bicycle commuters in Union City was estimated to be 792 riders, making a total of 1,585 daily trips, with these numbers projected to be 1,652 and 3,304 respectively in 2017.<br>– For this measure, it was assumed 4-8 trips per week shifting from car travel to bicycle travel. According to Victoria Transport Policy Institute, a resident would save $3.58 per trip of shift from driving to non-motorized travel during urban peak, $1.49 during urban non-peak, and $1.905 for rural travel. | *SOURCES*<br>*SFMTAT*<br>*Victoria Transport Policy Institute*<br>*AECOM* |
| **T-1.1b:** Continue build-out (goal of 25% build-out), to the extent feasible, of the Pedestrian Master Plan by 2020. | **Cost to City** | **High** | – There can be some variations in cost depending on project needs.<br>– Construction cost for sidewalks vary from $6/sq.ft for a concrete sidewalk to $60/linear foot for a 10-foot wide sidewalk<br>– Other infrastructural elements such as crosswalks ($500-$1,000), pedestrian actuators ($8,000), and pedestrian countdown signals ($30,000) have substantially greater costs | *SOURCES*<br>*Union City Bicycle and Pedestrian Master Plan 2006*<br><br>*FUNDING & FINANCING*<br>*A.2, A.3, F.1, F.6, F.9* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **Very Low** | – In 2008, the number of daily pedestrian commuters in Union City was estimated to be 428, making a total of 857 daily trips, with these | *SOURCES*<br>*SFMTAT*<br>*Victoria Transport Policy* |

| | | | | |
|---|---|---|---|---|
| | | | numbers projected to be 2,891 and 5,782 respectively in 2017.<br>– Assumed 4 trips per week shifting from car travel to pedestrian travel. According to Victoria Transport Policy Institute, a resident would save $3.58 per trip of shift from driving to non-motorized travel during urban peak, $1.49 during urban non-peak, and $1.905 for rural travel. | *Institute*<br>*AECOM* |
| **T-1.2:** Work with New Haven School District to maximize participation in Safe-Routes-to-School programs. | **Cost to City** | **Low** | – In 2003, Union City received a Safe Routes to School (SR2S) grant in the amount of $500,000. The SR2S funding was used in conjunction with other funds for pedestrian improvements along portions of Whipple Road, from Railroad Avenue to Ithaca Street and in front of Barnard-White Middle School. The project was a joint effort of the Railroad Safety Committee, the New Haven Unified School District and City staff.<br>– Assume that most infrastructure improvements necessary for Safe Routes to School will be provided under T-1.1 and T-1.2.<br>– Staff expense necessary to liaise with the New Haven School District – see T-Staff. | SOURCES<br>*Union City Bicycle and Pedestrian Master Plan 2006*<br><br>FUNDING & FINANCING<br>A.5 |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## T-2: Public Transit

| Measure | Categories | | Economics Assumptions | Sources |
|---|---|---|---|---|
| **T-2.1:** Provide transit priority and express routes on Routes 1A, 1B, and 2 within the city. | **Cost to City** | **High** | – Evaluate the potential of a universal transit pass program (e.g., Clipper, formerly Translink) for the community and regional riders.<br>– In fiscal year 2005-06, the average operating cost per passenger was $6.47, and the average operating cost per revenue hour was $66.85.<br>– Costs for supporting infrastructure: bus shelter is $40,000/each; bench is $2,000/each; other road, sidewalk, and roadway improvements are listed in Appendix E of the Pedestrian and Bicycle Master Plan. | SOURCES<br>*Union City Short Range Transit Plan 2008-2017*<br>*Union City Bicycle and Pedestrian Master Plan 2006*<br><br>FUNDING & FINANCING<br>*A.2, A.3, F.1, F.6, F.9* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |
| **T-2.2:** Work with Union City Transit to continue the conversion of bus fleet to compressed natural gas. | **Cost to City** | **Med - High** | – Sunline Transit Agency and Sacramento Regional Transit - The incremental capital costs of the NGV buses was between $US35,000 and $US50,000 per unit. This gave a payback period of approximately seven years or 300,000 miles per bus. It is important to note that the study acknowledged that newer buses have lower maintenance costs than older buses regardless of fuels. Sunline however stated that even so data showed the margin of cost reductions continued to grow over diesels. The diesel buses of SRT showed fuel costs nearly | SOURCES<br>*International Association for Natural Gas Vehicles* |

| | | | | |
|---|---|---|---|---|
| | | | double that of the NGV buses.<br>− Most costs borne by UC Transit | |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |
| **T-2.3:** **Work with Union City Transit to improve ease of use of transit system.** | **Cost to City** | **High** | − Infrastructure costs: Bench - $2,000/each; Bus Stop - $40,000/each, primarily borne by UC Transit.<br>− Universal transit pass program – A Silicon Valley study<br>− Potential to leverage current universal transit pass program Clipper program - Clipper is a transit fare payment system being implemented in the San Francisco Bay Area. It utilizes a reloadable card with a dual interface, making it capable of both contact and contactless transactions. Clipper (formerly called TransLink) was introduced as a pilot program in 2002 by the MTC to reduce the number of fare systems and help integrate transit systems in the Bay Area. Clipper is being rolled out in phases; currently five transit agencies, AC Transit, BART, Caltrain, Golden Gate Transit, and Muni accept the card on all routes.<br>− Cost of installing and maintaining a bike rack on a bus is estimated at between $50 -$300 per year. | *SOURCES*<br>*Union City Bicycle and Pedestrian Master Plan 2006*<br>*MTC*<br><br>*FUNDING & FINANCING*<br>*A.2, A.3, F.1, F.6, F.9* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## T-3: Transportation Demand Management

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **T-3.1:** **Increase participation employers in transportation demand management programs.** | **Cost to City** | **Med** | − Assumption that the City would provide a moderate incentive or subsidy to kick-off TDM program.<br>− A meta-analysis of employee transit subsidy programs in areas with “fair public transportation” revealed that an average subsidy of $102/month resulted in a 31% reduction in demand for parking.<br>− A meta-analysis of parking cash-out programs revealed that an average subsidy of $70/month resulted in a 25% reduction in demand for parking.<br>− Costs estimated at $2/day/employee. Total cost to City will vary depending on participation. | *SOURCES*<br>*California Air Resources Board*<br>*AECOM* |
| | **Private Cost** | **Med - High** | − Participating employers would pay employees either a transit subsidy or a parking cash out. Depending on participation in the incentive program, the costs vary. Average cost per participating employee estimated at $35-$50 per month. | *SOURCES*<br>*California Air Resources Board - Parking Cash Out Program* |
| | **Private Savings** | **Med - High** | − Participating employees would benefit from the incentive programs offered. CA ARB Parking Cash Out Law requires that transit subsidies | *SOURCES*<br>*California Air Resources Board - Parking Cash* |

| | | | | |
|---|---|---|---|---|
| | | | equal the parking cash out. Program benefits estimated at between $50 and $100 per month.<br>– See Cost to City for additional data of the costs and impacts of TDM investments. | *Out Program*<br>*Nelson Nygaard*<br>*SANBAG Carshare Program* |
| **T-3.2:** Enhance rideshare infrastructure to facilitate community participation. | **Cost to City** | **Low** | – The cost linking to the 511 Bay Area site infrastructure is minimal. The cost of building park and ride lots or other infrastructure could be considerable, unless current sites are used.<br>– Further study is required to determine if rideshare physical infrastructure improvements are needed. | *SOURCES*<br>*511 Bay Area Rideshare*<br><br>*FUNDING & FINANCING*<br>*D.2* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **Med** | – The average monthly commute cost is approximately $1,700 per year. Ridesharing with an average of 2 people in the car would reduce this expense to approximately $500. | *SOURCES*<br>*511 Bay Area Rideshare calculator* |

## T-4: Transportation Policies

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **T-4.1:** Ensure that City policies and budgetary processes facilitate a multi-modal transportation system within the community. | **Cost to City** | **Med** | – See T-Staff for total staff needs for the Transportation Action Area<br>– Staff expense to work with relevant City agencies to ensure that the City's transportation investments promote a balanced multimodal transportation system such as walking, biking, public transit, and carpooling.<br>– Staff expense to develop and apply evaluation criteria to determine the impact of transportation investments on the utilization of non-single-occupancy-vehicle transportation alternatives.<br>– Cost of ordinance development for complete streets policies<br>– Staff expense to adopt complete streets policies for new and major retrofit street construction projects<br>– Cost of ordinance development for complete streets policies<br>– Staff expense to adopt complete streets policies for new and major retrofit street construction projects<br>– Staff expense to partner with other Bay Area cities, counties, and agencies to advocate for regional and State transportation strategies for reducing greenhouse gas emissions. | *SOURCES*<br>*AECOM*<br>*Nelson Nygaard*<br><br>*FUNDING & FINANCING*<br>*A.6* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## Staffing Needs to Implement Measures in Transportation Action Area

| Measure | Categories | | Economics Assumptions | Sources |
|---|---|---|---|---|
| **T-Staff** | **Cost to City** | **Med** | – Staff resources necessary to implement all measures in Transportation Action Area: ~0.20 - 0.30 FTE, assuming that 1 FTE requires $150,000/yr, which includes salary + benefits (based on FY 2010-11). | *SOURCES*<br>*AECOM* |

## Buildings and Energy Action Area (E)

*Note: Quantitative energy cost and savings data (in per square foot units) generated through the SSIMe building energy analysis is represented in italics in the "Economic Assumptions" column.*

### E-1: Residential Energy Efficiency Retrofits

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-1.1:** Develop an energy efficiency program that provides outreach, financing, and other forms of assistance to homeowners. | **Cost to City** | **Low** | – Costs will vary considerably based on the purview of the program and how much it can build on current programs or several regional initiatives. Cost of developing the Retrofit Program is estimated to be $50,000-$75,000, which is shared with E-3.1. | *SOURCES*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, G.2* |
| | **Private Cost** | **Low** | *Initial Capital Costs: $0.27/sf*<br>– Costs will vary considerably based on the size, age, and condition of the home/building.<br>– Based on the cost of achieving the "Basic Package" of energy conservation measures – average of ~15-20% energy efficiency improvement.<br>– The home/building owner could leverage additional rebate and financing options to offset some of these costs.<br>– Cost of conducting energy audit depends greatly on the complexity of the building energy systems and its overall size ~$0.013-$0.13/sf (preliminary audit); $0.03-$0.09 (light + HVAC); $0.18-$0.50/sf (comprehensive audit) | *SOURCES*<br>*AECOM*<br>*California Energy Commission*<br>*Chevron Energy Solutions* |
| | **Private Savings** | **Very Low** | *Annual Energy Cost Savings: $0.03/sf/yr*<br>– Blended average of cost savings across residential building types. | *SOURCES*<br>*AECOM* |
| | **Payback** | **Short** | *Payback Period: ~8 years* | |

### E-2: Household Appliances

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-2.1:** Work with PG&E to promote existing household appliance upgrades. | **Cost to City** | **Low** | – Cost of collaborating with PG&E will require minimal staff expense. See E-Staff for total staff requirements to implement measures in the Energy Action Area. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **Varies** | *Initial Capital Costs: Varies*<br>– Appliance costs will vary but generally have a 0-20% cost premium as compared to conventional appliances.<br>– PG&E rebates exist for most energy efficient appliances<br>– Other energy efficient appliances available | *SOURCES*<br>*AECOM*<br>*EPA ENERGY STAR*<br>*PG&E*<br><br>*FUNDING & FINANCING*<br>*PG&E Rebates* |
| | **Private Savings** | **Varies** | *Annual Energy Cost Savings: Varies*<br>– Energy costs ~$0.14/kWh for residential and variable for non-residential<br>– Refrigerator: 120 kWh/year<br>– Dishwasher: 480 kWh/year<br>– Clothes Washer: 540 kWh/year<br>– Wall AC Unit: 100 kWh/year<br>– Light bulbs (assumes 20 replacements per building): 640 kWh year | *SOURCES*<br>*AECOM*<br>*EPA ENERGY STAR*<br>*DOE*<br>*PG&E* |
| | **Payback** | **Short - Med** | *Payback Period: ~10 years (variable)* | |

## E-3: Commercial Energy Efficiency Retrofits

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-3.1:** Develop an energy efficiency program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | **Cost to City** | **Low** | − Costs will vary considerably based on the purview of the program and how much it can build on current programs or several regional initiatives. Cost of developing the Retrofit Program is estimated to be $50,000-$75,000, which is shared with E-1.1. | *SOURCES*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, G.2* |
| | **Private Cost** | **Low** | *Initial Capital Costs: $1.01/sf*<br>− Costs will vary considerably based on the size, age, and condition of the building.<br>− Based on the cost of implementing basic, cost-effective energy conservation measures, which achieve an average of ~5-20% energy efficiency improvement.<br>− The building owner could leverage additional rebate and financing options.<br>− Cost of conducting energy audit depends greatly on the complexity of the building energy systems and its overall size ~$0.013-$0.13/sf (preliminary audit); $0.03-$0.09 (light + HVAC); $0.18-$0.50/sf (comprehensive audit) | *SOURCES*<br>*AECOM*<br>*California Energy Commission*<br>*Chevron Energy Solutions*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2* |
| | **Private Savings** | **Low** | *Annual Energy Cost Savings: $0.05/sf/yr*<br>− Blended average of cost savings across non-residential building types. | *SOURCES*<br>*AECOM* |
| | **Payback** | **Long** | *Payback Period: ~19 years* | |
| **E-3.2:** Promote 'Cool Roofs' to mitigate the urban heat island effect and reduce air conditioning use | **Cost to City** | **Low** | − Costs will vary considerably based on the purview of the program and how much it can build on current programs or several regional initiatives.<br>− Program and outreach costs shared with E-3.1 | *FUNDING & FINANCING*<br>*B.1, B.2, G.2* |
| | **Private Cost** | **Low - Med** | − According to the EPA, cool roof coatings on a low-slope roof might cost $0.75–$1.50 per square foot, while single-ply cool roof membrane costs vary from $1.50–$3.00 per square foot. The cost premium for cool roofs versus conventional roofing materials ranges from zero to 5 or 10 cents per square foot for most products, or from 10–20 cents for a built-up roof with a cool coating used in place of smooth asphalt or aluminum coating. | *SOURCES*<br>*LBNL Urban Heat Island Group*<br>EPA<br><br>*Levinson et. al. 2002. Inclusion of Cool Roofs in Nonresidential Title 24 Prescriptive Requirements. Lawrence Berkeley National Laboratory.*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2* |
| | **Private Savings** | **Med** | − A California study found that cool roofs provide an average yearly net savings of almost 50 cents per square foot. This number includes the price premium for cool roofing products and increased heating costs in the winter as well as summertime energy savings, savings from downsizing cooling equipment, and reduced labor and material costs over time due to the longer life of cool roofs compared with conventional roofs. | *SOURCES*<br>*LBNL Urban Heat Island Group*<br>EPA |
| | **Payback** | **Very Short** | *Payback Period: ~4 years* | *SOURCES*<br>*LBNL Urban Heat Island Group*<br>EPA |

## E-4: Building Performance Standards for New Construction

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-4.1:** Continue to implement the Green Building Ordinance. | **Cost to City** | **None** | − No additional cost to City. | <u>SOURCES</u><br>*AECOM* |
| | **Private Cost** | **N/A** | *Initial Capital Costs: $4.73/sf*<br>− The costs incurred through compliance with Tier I standards would be born primarily by the developer and project financier. The following information is directed at that target audience, though the economic category to the left pertains solely to the resident or businesses. Residents and businesses would not likely experience any additional costs from the application of this standard on new development, as the price of a building is more determined by market forces than building and construction costs.<br>− Costs will vary considerably based on the size, age, and condition of the building.<br>− Based on the cost of implementing basic, cost-effective energy conservation measures, which achieve an average of ~15% energy efficiency improvement for residential and 10% for non-residential.<br>− The building owner could leverage additional rebate and financing options to offset some of these costs. | <u>SOURCES</u><br>*AECOM*<br><br><u>FUNDING & FINANCING</u><br>*B.1, B.2, B.3, B.4* |
| | **Private Savings** | **Med** | *Annual Energy Cost Savings: $0.34/sf/yr*<br>− Blended average of cost savings across both new residential and non-residential building types. | <u>SOURCES</u><br>*AECOM* |
| | **Payback** | **N/A** | *Payback Period: ~12 years for developer*<br>*There would be no payback period for residents and businesses, as there is no additional investment required on their part for compliance with Tier I standards.* | |

## E-5: Smart Grid

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-5.1:** Work with PG&E and other cities in Alameda County to accelerate Smart Grid integration in existing and new buildings. | **Cost to City** | **Low** | − Cost of collaborating with PG&E will require minimal staff expense. See E-Staff for total staff requirements to implement measures in the Energy Action Area. | <u>SOURCES</u><br>*AECOM* |
| | **Private Cost** | **Med - High** | *Initial Capital Costs: Variable*<br>− Integrate Smart Grid technologies - highly variable depending on the quantity of new technology required - average per unit cost for energy controls is $500-$2,000; major appliances are not yet on the market. | <u>SOURCES</u><br>*AECOM*<br>*California Energy Commission*<br>*Chevron Energy Solutions* |
| | **Private Savings** | **Low** | *Annual Energy Cost Savings: $0.11/sf/yr*<br>− Assumes that home and building owners will make more informed energy use decisions based on the two-way communication enabled by smart meters, with the average energy savings being 5 percent.<br>− Blended average of cost savings across residential and non-residential building types. | <u>SOURCES</u><br>*AECOM*<br>*PG&E*<br>*DOE* |

| | | | | |
|---|---|---|---|---|
| | **Payback** | **N/A** | *Payback Period: N/A* | |

## E-6: Residential Hot Water Systems

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-6.1:** Develop program to facilitate the installation of solar hot water heaters in existing and new residential development. | **Cost to City** | **Low** | – See E-7.1 & E-7.3 – A solar hot water program could be implemented in tandem with solar PV.<br>– EPA estimates that ~5.9 construction, installation, operations, and maintenance jobs are created for every MW of installed capacity of solar hot water. | *SOURCES*<br>*AECOM*<br>*EPA* |
| | **Private Cost** | **Low** | *Initial Capital Costs: $4.10/sf*<br>– Average cost of solar hot water heater assumed to be $2,500 - $3,000. Average residential consumption is 600 kWh/month with average rates at $0.15/kWh. Energy savings assumed to be 30% for installation of solar water heaters.<br>– See "Private Savings" for rebate and incentive programs for solar hot water heaters. | *SOURCES*<br>*AECOM*<br>*California Solar Initiative*<br>*Department of Energy (DOE)*<br>*PG&E*<br>*Solar calculators - http://www.gosolarcalifornia.org/solar101/calculators.htmlEnvironmental*<br><br>*FUNDING & FINANCING*<br>*B.3* |
| | **Private Savings** | **Low** | *Annual Energy Cost Savings: $0.24/sf/yr*<br>– PG&E incentive program – between $12.82 and $4.70/therm replaced (capped at $1,875 to $687) depending on timing (early adopters receive higher incentive than later adopters.<br>– Federal tax incentives are 30% of installation cost through the DOE.<br>– A solar thermal system reduces the hot water bill approximately 50%. Savings will vary considerably. The average residential home consumes 350 gallons of water per day (roughly 50 cubic feet). Using the ACWD average rates of $2.918/100 cubic feet, a 50-100% savings would result in approximately of $60-$120 annual savings. | *SOURCES*<br>*AECOM*<br>*Handbook of Water Use and Conservation*<br>*California Solar Initiative*<br>*Department of Energy (DOE)*<br>*PG&E* |
| | **Payback** | **Long** | *Payback Period: 17 years* | |

| E-7: Solar PV | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources & Funding** |
| **E-7.1:** Develop a solar PV program that provides outreach, financing, and other forms of assistance to homeowners. | **Cost to City** | **Med** | − Cost of forming a Solar Power Program will vary based on the physical and code barriers that need addressing in facilitating solar development. As an example, Berkeley does general program management with in-house staff, but contracts out many of the key activities to a third party organization, Renewable Funding. Renewable Funding hosts a website, the online application system, provides information for customers, checks the title, provides documentation, provides customer support and guidance throughout process, and administrates the needed paperwork to approve the application before the City issues a bond and financing. Berkeley's administrative budget for the first two years is $227,000, which covers many of the startup costs and the additional work required to develop a new concept. It also covers "extras" such as developing this guide.<br>− Costs for Union City estimated at $50,000-$75,000 for program administration costs.<br>− EPA estimates that ~7.2 construction, installation, operations, and maintenance jobs are created for every MW of installed capacity of solar PV | *SOURCES*<br>Guide to Energy Efficiency and Renewable Energy Financing Districts for Local Governments<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, B.3, B.4, B.5, G.2* |
| | **Private Cost** | **High** | *Initial Capital Costs: ~$16,000 (will vary depending on building type, location, roof material, and solar PV system components)*<br>− Based on a 2-kW system installation<br>− Average solar photovoltaic system cost assumed to be ~$8.10/installed watt.<br>− Does not take into consideration rebates, incentives, or financing programs, as these vary over time. | *SOURCES*<br>*AECOM*<br>*California Solar Initiative*<br>*Environmental and Energy Study Institute*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, B.3, B.4, B.5* |
| | **Private Savings** | **Med** | *Annual Energy Cost Savings: $0.43/sf/yr*<br>− The cost of financing a solar system could be moderately reduced if group discounts were negotiated with a solar installer/contractor. The home/building owner could leverage other incentive: $1.55-$2.10/watt installed - California Solar Initiative incentives for homeowners in investor-owned utility territories (PG&E, SCE, SDG&E) to install photovoltaic systems (varies over time). There is also a federal tax credit of 30% on the total cost of the installed system. | *SOURCES*<br>*AECOM*<br>*California Solar Initiative*<br>*PG&E* |
| | **Payback** | **Long** | *Payback Period: ~19 years* | |
| **E-7.2:** Develop a solar PV program that provides outreach, financing, and other forms of assistance to commercial and industrial building owners. | **Cost to City** | **Med** | − See E-7.1 | *SOURCES*<br>See E-7.1<br><br>*FUNDING & FINANCING*<br>See E-7.1 |
| | **Private Cost** | **High** | *Initial Capital Costs:~$400,000 (will vary depending on building type, size, location, roof material, and solar PV system components)*<br>− Based on an average 50-kW system.<br>− See E-7.1 for average solar photovoltaic system cost.<br>− Does not take into consideration rebates, incentives, or financing programs, as these vary over time. | *SOURCES*<br>See E-7.1<br><br>*FUNDING & FINANCING*<br>See E-7.1 |

| | | | | |
|---|---|---|---|---|
| | **Private Savings** | **High** | *Annual Energy Cost Savings: $1.14/sf/yr*<br>– See E-7.1 for average solar photovoltaic system savings and rebates. | *SOURCES*<br>See E-7.1 |
| | **Payback** | **Long** | *Payback Period: ~19 years* | |
| **E-7.3:** Develop "Solar Cities" style public outreach and education platform to promote solar PV systems. | **Cost to City** | **Med** | – Cost of developing a SolarCitiesNow.com-style program that features educational workshops, web resources, and targeted information to assist property owners in making decisions about investing in a photovoltaic solar system. Other resources include website links to a consumer's guide, information about qualified solar installers, solar calculators, etc. Estimated at $75,000. | *SOURCES*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, B.4, G.2* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |
| | **Payback** | **N/A** | | |

## E-8: Wastewater Facility Energy Conservation and Reduction

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **E-8.1:** Explore opportunities to reduce energy consumption of wastewater facility through methane-to-energy production and solar photovoltaic installation. | **Cost to City** | **N/A** | – It is assumed that the facility costs will be financed by Union Sanitary District. Negligible cost to the City in collaborating with and supporting USD.<br>– Facility Cost: The net-cost of anaerobic digesters and the production of biogas depend on a number of factors, including the following: the methane production potential of the feedstock used; digester type; volume of waste and intended hydraulic retention time; the amount of waste available as a feedstock; the capital and operating costs of the digester type needed for a particular application; the intended use of the biogas produced; the value of the fertilizer produced as a byproduct of digestion.<br>– A feasibility study conducted for an anaerobic digester facility for SMUD found that an average cost of between $175 and $320/tons of waste per year could be expected for a facility for yard and food waste. | *SOURCES*<br>*SMUD*<br><br>*FUNDING & FINANCING*<br>*B.4* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |
| | **Payback** | **Short** | *Payback Period: ~9 years* | *SOURCE*<br>*Union Sanitary District* |

| Staffing Needs to Implement Measures in Buildings & Energy Action Area | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources** |
| **E-Staff** | **Cost to City** | **High** | – Staff resources necessary to implement all measures in Buildings & Energy Action Area: ~0.80 – 1.00 FTE, assuming that 1 FTE requires $150,000/yr, which includes salary + benefits (based on FY 2010-11). | SOURCES<br>*AECOM* |

| Buildings and Energy Optional Measures | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources & Funding** |
| ***Optional Measure 1:*** **Amend Green Building Ordinance to include an energy performance standard for major additions and remodels.** | **Cost to City** | **Low-Med** | – Cost of amending the Green Building Ordinance requires minimal staff expense.<br>– Assumed additional funding required by Department of Building Inspection for monitoring and enforcement of $10,000-$20,000. Cost of producing guidance and educational material on how to meet code - $25,000. | SOURCES<br>*AECOM* |
| | **Private Cost** | **Low** | *Initial Capital Costs: $0.79/sf*<br>– Costs will vary considerably based on the size, age, and condition of the building.<br>– Based on the cost of implementing basic, cost-effective energy conservation measures, which achieve an average of ~15% energy efficiency improvement<br>– The building owner could leverage additional rebate and financing options to offset some of these costs. | SOURCES<br>*AECOM*<br><br>FUNDING & FINANCING<br>*B.1, B.2, B.3, B.4* |
| | **Private Savings** | **Med** | *Annual Energy Cost Savings: $0.27/sf/yr*<br>– Blended average of cost savings across both new residential and non-residential building types. | SOURCES<br>*AECOM* |
| | **Payback** | **Very Short** | *Payback Period: ~3* | |
| ***Optional Measure 2:*** **Require all new non-residential construction to achieve California Green Building Code Tier I Energy Efficiency Standards (Section A5.203.1.1).** | **Cost to City** | **Low** | – Cost of amending the Green Building Ordinance requires minimal staff expense.<br>– Assumed additional funding required by Department of Building Inspection for monitoring and enforcement of $10,000-$20,000. Cost of producing guidance and educational material on how to meet code - $25,000. | SOURCES<br>*AECOM* |
| | **Private Cost** | **None** | *Initial Capital Costs: $8.67/sf*<br>– The costs incurred through compliance with Tier I standards would be born primarily by the developer and project financier. The following information is directed at that target audience, though the economic category to the left pertains solely to the resident or businesses. Businesses would not likely experience any additional costs from the application of this standard on new development, as the price of a building is more determined by market forces than building and construction costs.<br>– Costs will vary considerably based on the size, age, and condition of the building.<br>– Based on the cost of implementing basic, cost-effective energy conservation measures, which achieve an average of ~15% energy efficiency improvement above Title 24 (Tier I).<br>– The building owner could leverage additional | SOURCES<br>*AECOM*<br><br>FUNDING & FINANCING<br>*B.1, B.2, B.3, B.4* |

| | | | | |
|---|---|---|---|---|
| | | | rebate and financing options to offset some of these costs. | |
| | **Private Savings** | **Med** | *Annual Energy Cost Savings: $0.42/sf/yr*<br>Blended average of cost savings across both new residential and non-residential building types. | *SOURCES*<br>*AECOM* |
| | **Payback** | **N/A** | *Payback Period: ~21 years for developer*<br>*There would be no payback period for businesses, as there is no additional investment required on their part for compliance with Tier I standards.* | |
| ***Optional Measure 3:*** **Adopt a Residential Energy Conservation Ordinance (RECO) to require energy efficiency retrofits for point-of-sale and major renovations.** | **Cost to City** | **Med** | − Costs will vary considerably based on the purview of the program and how much it can build on current programs or several regional initiatives, such as Energy Upgrade California.<br>− According to SPUR, the cost to reduce one ton of carbon through RECO, assuming a 10-year life of energy improvements, is about $274. The government cost is about $3 per ton saved. Costs for Union City assumed to be 10% to 20% of San Francisco, or $20,000 to $40,000, which is shared with Option Measure 3. Ongoing enforcement and maintenance costs dependent on the level of additional infrastructure necessary. | *SOURCES*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, G.2* |
| | **Private Cost** | **Low** | *Initial Capital Costs: $0.38-$0.67/sf*<br>− Costs will vary considerably based on the size, age, and condition of the home/building.<br>− Based on the cost of achieving the "Advanced Package" of energy conservation measures – average of ~25% energy efficiency improvement.<br>− The home/building owner could leverage additional rebate and financing options to offset some of these costs.<br>− Cost of conducting energy audit depends greatly on the complexity of the building energy systems and its overall size ~$0.013-$0.13/sf (preliminary audit); $0.03-$0.09 (light + HVAC); $0.18-$0.50/sf (comprehensive audit) | *SOURCES*<br>*AECOM*<br>*California Energy Commission*<br>*Chevron Energy Solutions* |
| | **Private Savings** | **Very Low** | *Annual Energy Cost Savings: $0.03-$0.05/sf/yr*<br>− Blended average of cost savings across residential building types. | *SOURCES*<br>*AECOM* |
| | **Payback** | **Med** | *Payback Period: ~12 years* | |
| ***Optional Measure 4:*** **Adopt a Commercial Energy Conservation Ordinance (CECO) to require energy efficiency retrofits for point-of-sale and major renovations.** | **Cost to City** | **Med** | − Costs will vary considerably based on the purview of the program and how much it can build on current programs or several regional initiatives, such as Energy Upgrade California.<br>− See Option Measure 2. Costs for Union City assumed to be from $20,000 to $40,000, which is shared with Option Measure 2. Ongoing enforcement and maintenance costs dependent on the level of additional information technology infrastructure necessary. | *SOURCES*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2, G.2* |
| | **Private Cost** | **Med** | *Initial Capital Costs: $5.92-$7.40/sf*<br>− Costs will vary considerably based on the size, age, and condition of the building.<br>− Based on the cost of implementing an advanced package of cost-effective energy conservation measures, which achieve an average of ~25% energy efficiency improvement.<br>− The building owner could leverage additional rebate and financing options to offset some of these costs. | *SOURCES*<br>*AECOM*<br>*California Energy Commission*<br>*Chevron Energy Solutions*<br><br>*FUNDING & FINANCING*<br>*B.1, B.2* |

| | | | | |
|---|---|---|---|---|
| | | | – Cost of conducting energy audit depends greatly on the complexity of the building energy systems and its overall size ~$0.013-$0.13/sf (preliminary audit); $0.03-$0.09 (light + HVAC); $0.18-$0.50/sf (comprehensive audit) | |
| | **Private Savings** | **Med** | *Annual Energy Cost Savings: $0.27-$0.33/sf/yr*<br>– Blended average of cost savings across non-residential building types. | *SOURCES*<br>*AECOM* |
| | **Payback** | **Long** | *Payback Period: ~22 years* | |

## Waste Diversion and Reduction Action Area (WR)

| **WR-1: Waste Reduction Policies** | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources & Funding** |
| **WR-1.1:** Establish 90% waste reduction interim target for 2020. | **Cost to City** | **Med – High** | – Cost of developing Zero Waste Plan (Comprehensive Waste Management Plan): ~$100,000-$200,000. These costs could be distributed across other organizations such as StopWaste.Org. Implementation costs are not included in this estimation.<br>– Costs of developing ordinances stated in Action B, C, D, E, and F estimated at $10,000 each, with monitoring and enforcement averaging to an additional $10,000 per year. | *SOURCES*<br>*Stopwaste.org*<br>*AECOM* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **Med** | – The monthly charge for waste collection is a fixed fee for a given level of service. Some savings would be gained if a residence or business could reduce waste disposal to the point of obviating the need for an additional waste container. On average, the type of waste reduction needed for such a change is quite ambitious, greater than 50%. A switch from a 96-gallon to 64-gallon bin would generate ~$27/month of savings. | *SOURCES*<br>*Allied Waste, Inc.*<br>*City of Union City* |
| **WR-1.2:** Strengthen Construction and Demolition Ordinance to require 75% of debris to be recycled or reused. | **Cost to City** | **Low** | – Cost of strengthening the C&D ordinance will require minimal staff time. See WR-Staff. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **Low - Med** | – Often groups such as Habitat for Humanity may be interested in certain construction materials.<br>– It is possible to donate any unused materials to nonprofit organizations such as Habitat for Humanity. In addition to reducing waste and supporting a good cause, the material donation may be tax deductible. Clean gypsum board, trim, and surplus products like windows, doors, and fixtures would be welcomed. Unwanted materials can be listed on the local CalMAX Local Material Exchange. | *SOURCES*<br>*CalRecycle*<br>*Built It Green* |
| | **Private Savings** | **Med - High** | – A number of case studies analyze savings from reducing C&D waste, and they demonstrate a net cost savings of $0.10 to more than $1.00 per square foot. Labor rates, local tipping fee rates, and the ever-changing cost of building materials are factors that will affect the equation. But, particularly in locations with tipping fees exceeding $40 per ton, the cost savings will be significant. | *SOURCES*<br>*CalRecycle*<br>*Built It Green*<br>National Association of Home Building Research Center (NAHBRC) |

| | | | | |
|---|---|---|---|---|
| | | | – Employing Advanced Framing techniques can result in even larger savings, since both material costs and waste costs are reduced. Case studies conducted by the NAHBRC found cost savings ranging from $0.24 to $1.20 per square foot. In a 2000 square foot house, this amounts to approximately $500 to $2500 of net savings, which goes directly to profit.<br>– There are 36 recyclers located in Alameda County that could conduct an assessment of the potential savings and revenue streams that could be generated through recycling construction material. | |

## WR-2: Major Waste Generator Outreach

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WR-2.1:** Continue to partner with StopWaste.Org to improve technical assistance + financial support. | Cost to City | Med | – Conduct audits of major waste generators and recommend strategies to reduce waste and increase recycling. Also, provide training and other assistance, and collaborate with associations, producers, processors, service providers, unions and others to increase waste diversion.<br>– See WR-Staff. | *SOURCES* |
| | Private Cost | N/A | | |
| | Private Savings | N/A | | |

## WR-3: Public Outreach and Consumer Education

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WR-3.1:** Work with StopWaste.Org to expand outreach programs and incentivize waste reduction throughout Union City. | Cost to City | Med | – Enhancing implementation of existing residential recycling and food scrap composting programs through education and outreach will require staff time and financial resources estimated at $5,000/year. See WR-Staff.<br>– Minimal staff expense (and overall potential savings) to participate in EPA's WasteWise Communities. Some saving s could be generated through the technical assistance program.<br>– Cost of incorporating Waste Reduction Measures into Future Solid Waste and Recycling Franchise Agreements. See WR-Staff. | *SOURCES*<br>*CalRecycle*<br>*Stopwaste.org*<br>*EPA*<br>*AECOM* |
| | Private Cost | N/A | | |
| | Private Savings | Low | – Potential savings from waste reduction, contingent on transition to smaller waste-bin size.<br>– Increases access to waste audits and technical assistance also generates economic benefits for participants. | *SOURCES*<br>*AECOM* |

| | | | | |
|---|---|---|---|---|
| **WR-3.2:** Identify key sites/events for "Recycle on the Go" Infrastructure and implement program. | **Cost to City** | **Low** | – Cost of introducing recycling programs in places where large numbers of people gather, such as parks, sporting venues, transportation hubs such as bus and train stations, special events, and shopping centers will vary according to the extent of implementation. Cost estimates contain primarily the infrastructure costs (waste and recycling bins, signage, etc.) range from $200-$1,000 per event or venue depending on the size and waste generation potential. Typical recycling bins cost $50 with signs costing $25. Additional costs of installing containers and collecting waste and recyclables. | *SOURCES*<br>*EPA*<br>*Cool California* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## WR-4: Environmentally Responsible Purchasing

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WR-4.1:** Continue to work to urge adoption of legislation that requires extended producer responsibility | **Cost to City** | **Low** | – Staff expense to continue to work with StopWaste.org, Alameda County cities, and other organizations including the California Product Stewardship Council to urge adoption of legislation that requires extended producer responsibility. See WR-Staff. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## WR-5: Municipal Operations and Procurement Policy

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WR-5.1:** Increase waste reduction in municipal facilities and enhance implementation of EPP program. | **Cost to City** | **Low - Med** | – Cost of conducting an inventory of all municipal operations generating waste estimated at $5,000-$10,000.<br>– Cost of adopting a policy to go paperless whenever feasible negligible.<br>– Cost of expanding implementation of the City's existing Environmental Purchasing Policy will require a greater budget allocation for procurement to account for price differences between convention and EPPs. | *SOURCES*<br>*CalRecycle*<br>*StopWaste.org* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## Staffing Needs to Implement Measures in Waste Reduction Action Area

| Measure | Categories | Economics Assumptions | Sources |
|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **WR-Staff** | **Cost to City** | **Med** | – Staff resources necessary to implement all measures in Waste Reduction and Diversion Action Area: ~0.20 - 0.40 FTE, assuming that 1 FTE requires $150,000/yr, which includes salary + benefits (based on FY 2010-11). | *SOURCES*<br>*AECOM* |

## Water Conservation Action Area (WC)

**WC-1: Water Conservation Policies**

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WC-1.1:** Water Efficient Landscape Ordinance | **Cost to City** | **Low** | – Cost of developing a Water Efficient Landscape Ordinance requires minimal staff expense. See WC-Staff.<br>– Additional monitoring and enforcement costs estimated at $5,000-$10,000. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **Low - Med** | – Strategies for reduction in irrigation water can vary, but drip irrigation was used for the purposes of this analysis. Costs will vary considerably depending on the extent to which a drip irrigation system is installed. Pre-packaged drip irrigation kits start around $15 - $90 for a basic setup for a small area (approximately 100-250 square feet) and can run $100 -$500 for a higher-quality, more complex kit that will water a larger area. Buying the individual parts to design and install your own do-it-yourself custom irrigation system to water landscaping and/or vegetable/flower beds can cost anywhere from $40 -$100 in materials per 100 square feet, depending on how many watering lines are needed and how complex the systems. That works out to $200 -$500 for materials for a 20x25-foot area (500 square feet). Hiring a professional to design and install a drip irrigation system for landscaping can run $1,000 -$3,000 or more for a landscaped area of 500-1000 square feet, depending on location and the complexity of the drip system. | *SOURCES*<br>*Alameda County Water District*<br><br>*FUNDING & FINANCING*<br>www.dripirrigation.com |
| | **Private Savings** | **High** | – Participants in the program will implement water conservation measures. Savings will vary considerably. The average residential home consumes 350 gallons of water per day (roughly 50 cubic feet). Using the ACWD average rates of $2.918/100 cubic feet (2010 charges), a 50% savings would result in approximately of $250-$300 annual savings. | *SOURCES*<br>*Alameda County Water District*<br>*AECOM* |
| **WC-1.2:** Indoor and Outdoor Non-potable Water Systems Program | **Cost to City** | **Low – Med** | – Cost of developing an Indoor Recycled Water and Outdoor Rainwater Collection Systems Program requires staff expense, and will require collaboration with ACWD, StopWaste.org, and other relevant organizations with technical expertise. See WC-Staff. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **Med - High** | – Participants in the program will implement water recycling conservation measures. Appliances that use recycled water vary in terms of cost, but easily could exceed $1,000 (total cost, not incremental cost above replacement).<br>– The cost of rainwater collection systems is approximately $1/1-gallon of capacity in the system. An average system (~1,500 gallons) would cost approximately $1,500. | *SOURCES*<br>*AECOM*<br>*City of Portland Department of Planning and Sustainability*<br><br>*The Rainwater Harvesting Community* |

| | | | | |
|---|---|---|---|---|
| | **Private Savings** | **Low-Med** | − Participants in the program will implement water conservation measures. Savings will vary considerably. The average residential home consumes 350 gallons of water per day (roughly 50 cubic feet). Using the ACWD average rates of $2.918/100 cubic feet (2010 charges), a 10% savings would result in approximately of $50-60 annual savings. | *SOURCES*<br>*Handbook of Water Use and Conservation*<br>*Alameda County Water District*<br>*AECOM* |
| **WC-1.3:** Work with Alameda County Water District to consider conservation pricing or full-cost pricing of water. | **Cost to City** | **Very Low** | − Cost of working with ACWD Conservation Pricing schemes requires minimal staff expense. See WC-Staff. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **Low** | − Participants in the program will implement water conservation measures. Savings will vary considerably. The average residential home consumes 350 gallons of water per day (roughly 50 cubic feet). Using the ACWD average rates of $2.918/100 cubic feet (2010 charges), a 5% savings would result in approximately of $25-30 annual savings. | *SOURCES*<br>*Handbook of Water Use and Conservation*<br>*Alameda County Water District*<br>*AECOM* |

## WC-2: Public Outreach and Consumer Education Programs

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WC-2.1:** Work with ACWD to expand outreach programs and incentivize water conservation throughout Union City. | **Cost to City** | **Med – High** | − Costs for developing a funding source for water conservation will vary depending on the level of incentive and program participation rates. Also, the source of funding will determine if City resources are utilized, or if other revenue generating mechanisms are employed, such as a water fee tariff. Estimated costs range from $20,000-$100,000 to fund a program that supports on average 20 to 100 incentives to implement a water conservation strategy (average of $100 per incentive). This represents a low estimate. Other programs could require significantly higher levels of funding. | *SOURCES*<br>*EPA Cases in Conservation* |
| | **Private Cost** | **Low - Med** | − Participants in the program will implement water conservation measures. Costs will vary considerably depending on condition of building's water fixtures and the need to repair leaks. Some samples of average costs: Installation of low flow showerhead - $17; Leak detection and repair - $11-$29; installation of high efficiency clothes washer - $200+.<br>− Assumed typical water charges (average of $11.08/month base charge + $2.918 per 100 cubic feet per day for houses that consume between 173 and 393 gallons per day) and consumption (average of 300 gallons per household per day) from ACWD for residential single family homes as basis for cost savings calculation. Used a conversion ratio of 100 cubic feet to 748 gallons of water. Assumed 50% reduction in household water demand (which comprises 20% of water household demand). | *SOURCES*<br>*Alameda County Water District*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*D.4* |
| | **Private Savings** | **Low - Med** | − Participants in the program will implement water conservation measures. Savings will vary considerably. The average residential home consumes 350 gallons of water per day (roughly 50 cubic feet). Using the ACWD average rates | *SOURCES*<br>*Handbook of Water Use and Conservation*<br>*Alameda County Water District* |

| | | | | |
|---|---|---|---|---|
| | | | of $2.918/100 cubic feet (2010 charges), a 10% savings would result in approximately of $50-$100 annual savings. | *AECOM* |
| **WC-2.2:** Become a member in existing water conservation and outreach programs. | **Cost to City** | **Very Low** | – Cost of becoming a partner in EPA's Water Sense program: WaterSense is a partnership sponsored by the EPA to promote water-efficient products and practices requires minimal staff expense. See WC-Staff.<br>– Cost of adopting a resolution for the Ahwahnee Water Principles for Resource-Efficient Land Use requires minimal staff expense. See WC-Staff. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## WC-3: Innovation and Leadership in Water Conservation

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WC-3.1:** Identify potential demo projects for low-impact development (LID) practices. | **Cost to City** | **Low – Med** | – Initial capital investment to develop and implement low impact development strategies in Union City will vary depending on the extent of implementation, technique employed, as well as site conditions. Many low impact development strategies such as rain gardens, constructed natural wetlands, and permeable pavement require additional investment. A general rule of thumb is that residential bioretention facilities average about $3 to $4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between $10 to $40 per square foot, based on the need for control structures, curbing, storm drains and underdrains. Some estimates put the cost of permeable paving at two to three times that of conventional asphalt paving. Using permeable paving, however, can reduce the cost of providing larger or more stormwater BMPs on site, and these savings should be factored into any cost analysis. | *SOURCES*<br>*Urban Design Tools*<br><br>*FUNDING & FINANCING*<br>*G.1* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## WC-4: Municipal Water Conservation

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **WC-4.1:** Implement water conservation programs in City-operated | **Cost to City** | **Low – Med** | – The most cost-effective methods of water conservation are behavioral, and do not require technological fixes.<br>– Cost of implementing water conservation measures in municipal buildings will vary according to the fixture and appliance replacements necessary for technological fixes. | *SOURCES*<br>*Green California – Water Efficient Fixtures and Appliances*<br><br>*FUNDING & FINANCING*<br>*ACWD Rebates; USD* |

| | | | | |
|---|---|---|---|---|
| facilities. | | | – Water-efficient low-flow toilets, urinals, sinks, and shower fixtures; high-efficiency clothes washers, and low water consumption kitchen appliances can return their cost through reduction in water consumption, pumping, and treatment, and in energy used to heat water. | *Rebates; EPA grants* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## Staffing Needs to Implement Measures in Water Conservation Action Area

| Measure | Categories | | Economics Assumptions | Sources |
|---|---|---|---|---|
| **WC-Staff** | **Cost to City** | **Med** | – Staff resources necessary to implement all measures in Water Conservation Action Area: ~0.20 – 0.30 FTE, assuming that 1 FTE requires $150,000/yr, which includes salary + benefits (based on FY 2010-11). | *SOURCES*<br>*AECOM* |

## Water Conservation Optional Measure

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| ***Optional Measure 5:*** **Residential Water Conservation Ordinance** | **Cost to City** | **Low** | – Costs will vary considerably based on the purview of the program and how much it can build on current programs or several regional initiatives, such as Energy Upgrade California, which may have some components that address water conservation.<br>– Cost of implementing a Residential Water Conservation Ordinance can be coupled with Building and Energy Optional Measures 2 (RECO) and 3 (CECO). Additional cost for monitoring and enforcement estimated at $10,000-$20,000. | *SOURCES*<br>*Green California – Water Efficient Fixtures and Appliances*<br><br>*FUNDING & FINANCING*<br>*ACWD Rebates; USD Rebates; EPA grants* |
| | **Private Cost** | **Low - Med** | – Participants in the program will implement water conservation measures. Costs will vary considerably depending on condition of building's water fixtures and the need to repair leaks. Some samples of average costs: Installation of low flow showerhead - $17; Leak detection and repair - $11-$29; installation of high efficiency clothes washer - $200+.<br>– Assumed typical water charges (average of $11.08/month base charge + $2.918 per 100 cubic feet per day for houses that consume between 173 and 393 gallons per day) and consumption (average of 300 gallons per household per day) from ACWD for residential single family homes as basis for cost savings calculation. Used a conversion ratio of 100 cubic feet to 748 gallons of water. Assumed 20% reduction in household water demand (which comprises 50% of water household demand). | *SOURCES*<br>*Alameda County Water District*<br>*AECOM*<br><br>*FUNDING & FINANCING*<br>*D.4* |
| | **Private Savings** | **Med** | – Participants in the RWCO program will implement water conservation measures. Savings will vary considerably. The average residential home consumes 350 gallons of | *SOURCES*<br>*Handbook of Water Use and Conservation*<br>*Alameda County Water* |

| | | | | |
|---|---|---|---|---|
| | | | water per day (roughly 50 cubic feet). Using the ACWD average rates of $2.918/100 cubic feet (2010 charges), a 20% savings would result in approximately of $100 annual savings. | *District*<br>*AECOM* |

## Green Infrastructure Action Area (GI)

| GI-1: Carbon Sequestration | | | | |
|---|---|---|---|---|
| **Measure** | **Categories** | | **Economics Assumptions** | **Sources & Funding** |
| **GI-1.1:** Expand the urban forest in order to sequester carbon and reduce building energy consumption. | **Cost to City** | **Med - High** | − Public Works Agency – Public Works stated that the City would approach planting capacity in 8 years with an additional 4,000 trees<br>− Purchase/installation/maintenance cost of $800 per tree for a total of approximately $32,000.<br>− The City can draw on resources at the Center for Urban Forestry Research.<br>− RPM Ecosystems estimates that creating a nursery in Union City to produce 500 trees/year would cost $216,000-$293,000 in initial capital costs, with $66,000-$78,000/year in operational costs to keep the nursery in production. There would local economic and employment benefits to this approach. | *SOURCES*<br>*Union City Bicycle and Pedestrian Master Plan 2006*<br>*Union City Public Works Department*<br>*RPM Ecosystems*<br><br>*FUNDING & FINANCING*<br>*D.1* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **Very Low** | − Average tree in Union City planted an average distance from the house would result in approximately $8-$10 of annual energy savings. | *SOURCES*<br>*USDA Department of Forestry Center for Urban Forestry Research (CUFR)* |
| **GI-1.2:** Expand or restore natural habitat areas in the city where possible. | **Cost to City** | **Low** | − Cost of conducting a rapid ecological assessment of opportunities for preservation of valuable ecological resources or restoration of degraded ecosystems estimated at $10,000-$20,000 (will vary depending on the extent of on-the-ground research vs. remote sensing).<br>− Cost of developing an implementation plan to maximize the potential for onsite ecological restoration and preservation estimated at $5,000-$10,000. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |
| **GI-1.3:** Include carbon sequestration as an objective within City-led natural area restoration projects. | **Cost to City** | **Very Low** | − Minimal staff time required to maintain the City's high standard for acquiring and protecting urban green and open space to promote functional forest ecosystems with high potential to sequester carbon dioxide. | *SOURCES*<br>*AECOM* |
| | **Private Cost** | **N/A** | | |
| | **Private Savings** | **N/A** | | |

## GI-2: Community Gardens and Agriculture

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **GI-2.1:** Continue and expand the existing local community garden program to increase local food security and provide local recreation amenities. | Cost to City | Low - Med | – Costs range from $1,500 to $4,000 per community garden to establish.<br>– Cost of conducting an inventory to identify farmable land within Union City with potential to convert to community gardens and/or urban farms estimated at $5,000-$10,000.<br>– Minimal staff time required to work with local NGOs to provide education and incentives for organic and sustainable food production, including: greenhouses, food preservation and food processing facilities within neighborhood centers to increase capacity for local food processing, storage, and distribution. | *SOURCES*<br>*Urban Harvest*<br><br>*FUNDING & FINANCING*<br>*D.2* |
| | Private Cost | Low | – The Union City Community Garden, the sole community garden that the City currently operates, is located at Venito Avenue in the Seven Hills development off Mission Boulevard. As of 2010, it consisted of 17 plots, each measuring approximately 15 feet by 30 feet. The annual fees are $50 for a plot including water and $20 for compost, sand and horse manure. There is an additional community garden located on Mission Boulevard near the Decoto neighborhood that is not affiliated with the City. | *SOURCES*<br>*Union City* |
| | Private Savings | N/A | | |

## GI-3: Municipal Leadership in Innovation

| Measure | Categories | | Economics Assumptions | Sources & Funding |
|---|---|---|---|---|
| **GI-3.1:** Identify educational demo projects for Bay Friendly Landscaping Projects. | Cost to City | Low | – Cost of coordinating with City agencies and Stopwaste.org to identify educational demonstration projects for Bay Friendly Landscaping Projects will be negligible.<br>– Cost of implementing projects on a variety of landscape types sizes, such as lawns, ornamental gardens, vegetable gardens, xeriscapes, and wooded lots will vary depending on the extent of implementation and project type. | *SOURCES*<br>*Urban Ecology*<br>*AECOM* |
| | Private Cost | N/A | | |
| | Private Savings | N/A | | |

## Staffing Needs to Implement Measures in Green Infrastructure Action Area

| Measure | Categories | | Economics Assumptions | Sources |
|---|---|---|---|---|
| **GI-Staff** | Cost to City | Low - Med | – Staff resources necessary to implement all measures in Green Infrastructure Action Area: ~0.10 – 0.20 FTE, assuming that 1 FTE requires $150,000/yr, which includes salary + benefits (based on FY 2010-11). | *SOURCES*<br>*AECOM* |

This page was left intentionally blank.

# Appendix D: Building Energy

## Sustainable Systems Integration Method - Energy (SSIMe) CAP Building Energy Analysis

In order to identify the energy and carbon reduction potential of Union City's building stock, analysis was undertaken to identify the most cost-effective energy conservation measures that could be applied to the wide range of buildings (in terms of use, operation and age) that are seen across the city. At this high level of study, and without having conducted on-site energy audits of buildings, general strategies were developed that could be easily implemented through City policy or incentive schemes using AECOM's SSIMe CAP process. Figure D-1 shows a flow diagram of the SSIMe CAP process, the methodology of which is outlined below:

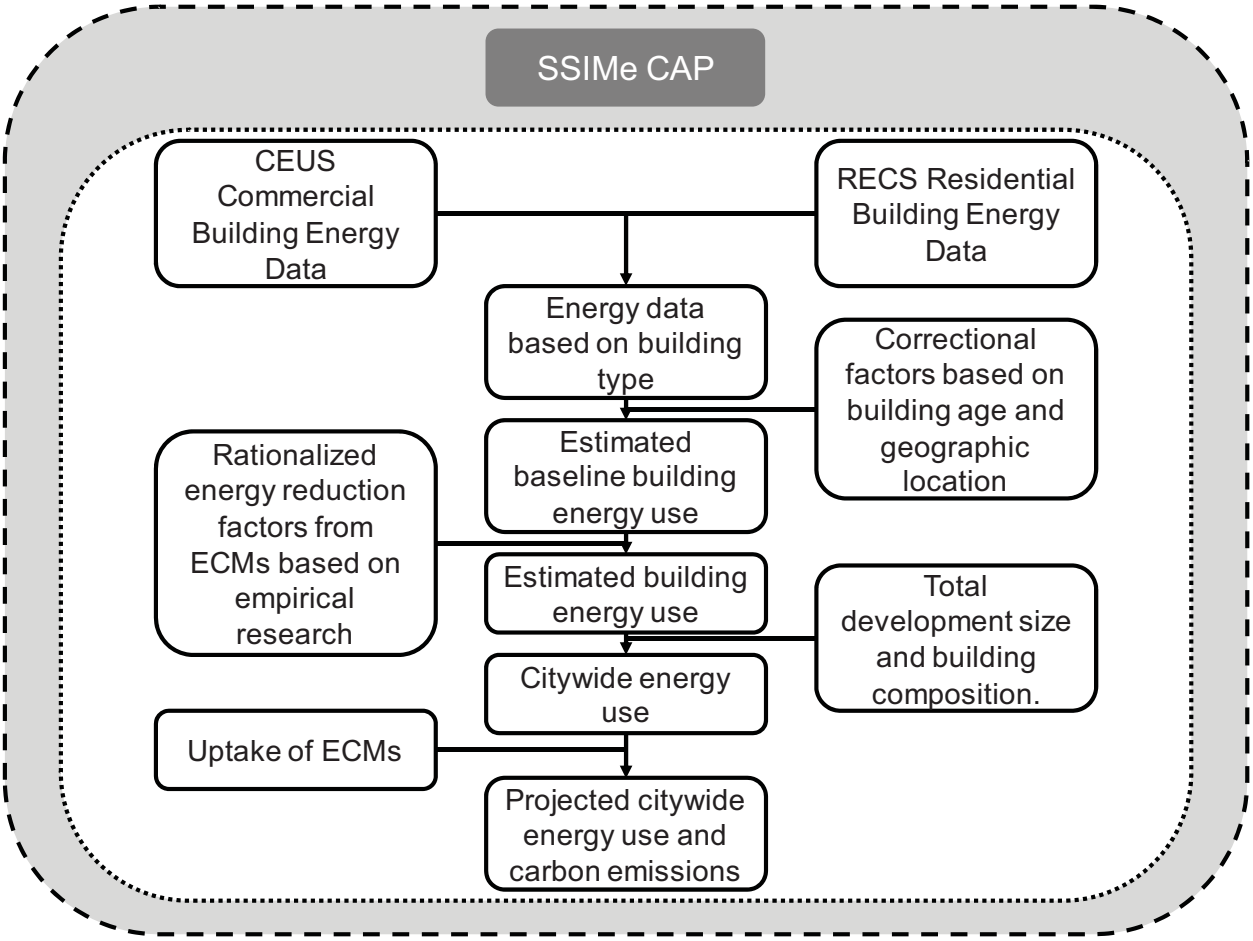

SSIMe CAP
CEUS Commercial Building Energy Data
RECS Residential Building Energy Data
Energy data based on building type
Correctional factors based on building age and geographic location
Estimated baseline building energy use
Rationalized energy reduction factors from ECMs based on empirical research
Estimated building energy use
Total development size and building composition.
Citywide energy use
Uptake of ECMs
Projected citywide energy use and carbon emissions

***Figure D-1*** *- SSIMe CAP Process Flow Diagram*

### SSIMe CAP Process

Without having access to building sub-metered energy data or energy audits for a range of buildings across the city, it is impossible to exactly determine the end energy use (i.e., the energy use associated with uses such as cooling, heating or lighting) for different buildings. Therefore, energy cost and savings were determined by assessing the impact of different packages of energy conservation measures (ECMs). For a CAP level of analysis, AECOM uses energy database data to identify and estimate the end use of energy in each of the typical building types that make up the city's total building stock. Table D-2 shows the building types that were included in the Union City study:

*Table D-2: Building Types included as part of SSIMe Building Energy Analysis*

| Non Residential Buildings | Residential Buildings |
|---|---|
| Small Office | Single Family Detached |
| Institutional | Single Family Attached / Multi Family |
| Grocery | |
| Healthcare | |
| Lodging | |
| Miscellaneous | |
| Refrigerated Warehouse | |
| Restaurant | |
| Retail | |
| Unrefrigerated Warehouse | |

For the Union City CAP study, the California Energy Commission's (CECs) Commercial End Use Survey (CEUS) database was to estimate the energy use associated with non residential buildings and the Department of Energy's Residential Energy Consumption Survey (RECS) database was used for the residential building analysis.

## CEUS

The California Commercial End-Use Study (CEUS) is a comprehensive study of commercial sector energy end use in California. The database was developed based on a stratified random sample of 2,790 commercial facilities from the service areas of Pacific Gas and Electric (PG&E), San Diego Gas & Electric (SDG&E), Southern California Edison (SCE), Southern California Gas Company (SCGC), and the Sacramento Municipal Utility District (SMUD).

The survey assessed the energy use data for 12 common commercial building type categories (colleges, grocery stores; healthcare facilities, large offices, lodgings, refrigerated warehouses, restaurants, retail buildings, schools, small offices, warehouses and miscellaneous buildings).

The results of the study are freely available via the CEC website, and include data of floor stocks, fuel shares, electric and natural gas consumption, energy-use indices (EUIs) and energy intensities for each of the commercial building type categories. The data is separated by each of the 11 different climate zones in California served by the utility providers outlined above. For the Union City study, CEUS PG&E climate zone 5 data was used for each building type, corresponding to the climate zone for Union City.

## RECS

The Residential Energy Consumption Survey (RECS) provides information on the use of energy in residential housing units in the United States. The survey accounts for the physical characteristics of the housing units, the appliances utilized including space heating and cooling equipment, demographic characteristics of the household, the types of fuels used, and other information that relates to energy use.

The 2005 survey collected data from 4,382 households in housing units statistically selected to represent the 111.1 million housing units in the United States. RECS data is tabulated for the four Census regions (Northeast, Midwest, West, and South), the nine Census divisions (New England, Middle Atlantic, East North Central, West North Central, Mountain, Pacific, West South Central, East South Central and South Atlantic), and separately for the four most populous states; California, Florida, New York, and Texas. For

the Union City study, residential energy use data was used for the California region. Data is separated into five primary housing types: apartments in two-four unit buildings, apartments in five or more unit buildings, mobile homes, single-family attached houses and single-family detached houses.

The results of the study are available on the US Energy Information Administration's (EIA) website and include energy consumption and expenditure data for the following end uses in each housing type: space heating, air conditioning, water heating, refrigerators, appliances and lighting.

## Calibration of RECS and CEUS Energy Data

In order to better align the RECS and CEUS information with the age and characteristics of the buildings in Union City, correction factors were applied to the database data.

Although the RECS database provides information pertaining to the different end use characteristics of different building types by age, it is not possible to directly correlate this information to the location-based end use data utilized for the study. As such, correction factors were applied to the location based data based on statistical analysis of the age data, in order to estimate the energy end use of building types of different ages.

Likewise, CEUS does not provide an assessment of energy end use by age of building; therefore historical versions of Title 24 were used to correct the end-use data for different ages of buildings, based on the increasing minimum performance standards since Title 24's inception in 1978.

## Energy Conservation Measure (ECM) Analysis

Following the baseline energy use calibration exercise, ECM analysis was undertaken to assess possible strategies that could be applied to the buildings across the city (through policy, incentives or other means) in order to help reduce the city's total carbon emissions. A range of ECMs were tested on each building type in order to examine their effectiveness at reducing building energy consumption, including the following:

- Building envelope upgrades
- Upgrading heating systems
- Upgrading cooling systems
- Installing variable-frequency-drives (VFDs)
- Upgrading interior lighting
- Upgrading exterior lighting
- Installing low flow water fixtures and fittings
- Upgrading service hot water systems
- Installing solar hot water heating systems
- Photovoltaic energy generation

Typically two levels of upgrade were assessed for each measure; a basic upgrade to "current code standards" or a further upgrade to "exceed code standards". Rough order of magnitude (ROM) costs were applied to each item in order to estimate the cost delta and simple payback of different packages of options. For each building type, packages of ECM options were created in line with different policies or incentives that the City could implement to encourage energy upgrades in buildings. Tables C-3 and C-4 summarizes the ECM packages for residential buildings (existing and new) and Tables C-5 and C-6 summarizes the ECM packages for non-residential buildings (existing and new):

## Citywide Savings Extrapolation

Following the ECM analysis of individual buildings, the building by building savings were then extrapolated across the city, based on time-dependent uptake rates for each package. From this, the total carbon emissions savings across the city from building ECMs was calculated.

*Table C-3: Energy Conservation Measures for Existing Residential Buildings*

| EXISTING RESIDENTIAL | Energy Conservation Measure Package | Heating and Cooling | | | Lighting | Hot Water Heating | | Solar | Economic Results | | | Financial Results | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Loft Insulation | Ductwork Sealing | Upgrade Heating Systems | Install CFLs | Hot Water Boiler Upgrade | Solar thermal hot water system | PV | % Energy Use Improvement | Capital Cost ($/sq ft) | Simple Payback (Years) | Initial Investment | Annual Savings | Annual Savings per sf |
| Single Family Detached Pre 1980 | Option A | ♦ | ♦ | | ♦ | | | | 15.7% | $0.49 | ~4 | $1,100 | $280 | $0.13 |
| | Option B | ♦ | ♦ | ♦♦ | ♦ | | | | 33.0% | $1.80 | ~10 | $4,000 | $390 | $0.18 |
| | Option C | ♦ | ♦ | ♦♦ | ♦ | ♦♦ | ♦ | | 56.7% | $3.67 | ~15 | $8,100 | $540 | $0.25 |
| | Option D | ♦ | ♦ | ♦♦ | ♦ | | | ♦ | 51.9% | $6.88 | ~17 | $15,100 | $870 | $0.40 |
| Single Family Detached Post 1980 | Option A | ♦ | ♦ | | ♦ | | | | 16.3% | $0.49 | ~5 | $1,100 | $230 | $0.10 |
| | Option B | ♦ | ♦ | ♦♦ | ♦ | | | | 24.7% | $1.80 | ~15 | $4,000 | $270 | $0.12 |
| | Option C | ♦ | ♦ | ♦♦ | ♦ | ♦♦ | ♦ | | 44.8% | $3.67 | ~22 | $8,100 | $370 | $0.17 |
| | Option D | ♦ | ♦ | ♦♦ | ♦ | | | ♦ | 49.3% | $6.88 | ~20 | $15,100 | $760 | $0.35 |
| Single Family Attached Pre 1980 | Option A | ♦ | ♦ | | ♦ | | | | 15.5% | $0.53 | ~4 | $900 | $270 | $0.15 |
| | Option B | ♦ | ♦ | ♦♦ | ♦ | | | | 33.9% | $2.14 | ~10 | $3,800 | $390 | $0.22 |
| | Option C | ♦ | ♦ | ♦♦ | ♦ | ♦♦ | ♦ | | 57.2% | $4.42 | ~15 | $8,000 | $540 | $0.30 |
| | Option D | ♦ | ♦ | ♦♦ | ♦ | | | ♦ | 52.4% | $8.34 | ~17 | $15,000 | $870 | $0.48 |
| Single Family Attached Post 1980 | Option A | ♦ | ♦ | | ♦ | | | | 16.0% | $0.53 | ~4 | $900 | $220 | $0.12 |
| | Option B | ♦ | ♦ | ♦♦ | ♦ | | | | 25.0% | $2.14 | ~15 | $3,800 | $260 | $0.14 |
| | Option C | ♦ | ♦ | ♦♦ | ♦ | ♦♦ | ♦ | | 45.0% | $4.42 | ~22 | $8,000 | $360 | $0.20 |
| | Option D | ♦ | ♦ | ♦♦ | ♦ | | | ♦ | 49.4% | $8.34 | ~20 | $15,000 | $750 | $0.42 |

## *Table C-4: Energy Conservation Measures for New Residential Buildings*

| NEW RESIDENTIAL | Energy Conservation Measure Package | Heating and Cooling | | | | Lighting and Appliances | | | | Hot Water Heating | | Solar | Economic Results | | | Financial Results | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Loft Insulation | Ductwork Sealing | High Efficiency Windows | Heating Systems | Install CFLs | Install Energy Star Washer | Install Energy Dishwasher | Install Energy Star Refrigerator | Hot Water Boiler Upgrade | Solar thermal hot water system | PV | % Energy Use Improvement | Capital Cost ($/sq ft) | Simple Payback (Years) | Initial Investment | Annual Savings | Annual Savings per sf |
| New Single Family Detached | Baseline | ◆ | ◆ | | ◆ | | | | | | | | 0.0% | - | - | - | - | - |
| | Option A | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 15.7% | $0.47 | ~4 | $1,300 | $300 | $0.11 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 27.3% | $2.37 | ~19 | $6,600 | $350 | $0.13 |
| | Option C | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | ◆ | | 47.7% | $4.02 | ~26 | $11,300 | $430 | $0.15 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | | ◆ | 60.5% | $7.49 | ~25 | $21,000 | $850 | $0.30 |
| New Single Family Attached | Baseline | ◆ | ◆ | | ◆ | | | | | | | | 0.0% | - | - | - | - | - |
| | Option A | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 14.2% | $0.57 | ~3 | $900 | $280 | $0.19 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 27.2% | $2.67 | ~12 | $4,000 | $330 | $0.22 |
| | Option C | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | ◆ | | 47.3% | $4.69 | ~17 | $7,000 | $420 | $0.28 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | | ◆ | 59.7% | $8.93 | ~16 | $13,400 | $840 | $0.56 |
| New Single Family Attached 2-4 Unit | Baseline | ◆ | ◆ | | ◆ | | | | | | | | 0.0% | - | - | - | - | - |
| | Option A | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 12.2% | $0.93 | ~3 | $900 | $340 | $0.34 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 25.5% | $3.25 | ~8 | $3,200 | $420 | $0.42 |
| | Option C | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | ◆ | | 42.3% | $6.19 | ~12 | $6,200 | $530 | $0.53 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | | ◆ | 48.5% | $10.75 | ~12 | $10,800 | $930 | $0.93 |
| New Single Family Attached 5+ Unit | Baseline | ◆ | ◆ | | ◆ | | | | | | | | 0.0% | - | - | - | - | - |
| | Option A | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 14.0% | $0.84 | ~3 | $800 | $260 | $0.26 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 24.6% | $3.49 | ~12 | $3,500 | $300 | $0.30 |
| | Option C | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | ◆ | | 45.0% | $6.39 | ~17 | $6,400 | $380 | $0.38 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | | ◆ | 59.1% | $12.87 | ~16 | $12,900 | $810 | $0.81 |
| AVERAGE | Baseline | ◆ | ◆ | | ◆ | | | | | | | | | | | | | |
| | Option A | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 14.0% | $0.70 | ~4 | $1,100 | $295 | $0.19 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | | 26.2% | $2.94 | ~13 | $4,600 | $350 | $0.22 |
| | Option C | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | ◆ | | 45.6% | $5.32 | ~19 | $8,400 | $440 | $0.28 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | ◆ | ◆◆ | | ◆ | 57.0% | $10.01 | ~18 | $15,800 | $858 | $0.54 |

## *Table C-5: Energy Conservation Measures for Existing Non-residential Buildings*

| EXISTING NON RESIDENTIAL | Energy Conservation Measure Package | Heating and Cooling | | | Lighting | | Hot Water Heating | | | Solar | Economic Results | | | Financial Results | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Heating Upgrades | Cooling Upgrades | VFDs | Lighting Upgrades | Lighting Control Upgrades | Install Low Flow Fixtures | Hot Water Boiler Upgrade | Solar thermal hot water system | PV | % Energy Use Improvement | Capital Cost ($/sq ft) | Simple Payback (Years) | Initial Investment | Annual Savings | Annual Savings per sf |
| Commercial (<30kSF) | Option A | | | ◆ | | | ◆ | | | | 2.4% | $1.55 | ~22 | $30,900 | $1,400 | $0.07 |
| | Option B | ◆ | ◆ | ◆ | | | ◆ | | | | 17.0% | $9.30 | ~30 | $186,000 | $6,300 | $0.32 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 32.8% | $19.42 | ~23 | $388,400 | $16,800 | $0.84 |
| | Option D | ◆ | ◆ | ◆ | | | ◆ | | | ◆ | 31.6% | $19.38 | ~21 | $387,500 | $18,400 | $0.92 |
| Institutional (>30kSF) | Option A | | | ◆ | | | ◆ | | | | 4.1% | $1.57 | ~15 | $62,800 | $4,300 | $0.11 |
| | Option B | ◆ | ◆ | ◆ | | | ◆ | | | | 16.2% | $8.12 | ~23 | $324,900 | $14,100 | $0.35 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 30.9% | $18.04 | ~21 | $721,700 | $33,800 | $0.85 |
| | Option D | ◆ | ◆ | ◆ | | | ◆ | | | ◆ | 42.7% | $26.88 | ~19 | $1,075,400 | $55,400 | $1.39 |
| Grocery | Option A | | | ◆ | | | ◆ | | | | 3.3% | $0.79 | ~7 | $18,900 | $2,900 | $0.12 |
| | Option B | | | ◆ | ◆◆ | | ◆ | ◆◆ | | | 15.5% | $9.11 | ~10 | $218,600 | $22,700 | $0.95 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | | ◆ | ◆◆ | | | 18.9% | $13.76 | ~13 | $330,100 | $25,200 | $1.05 |
| | Option D | | | ◆ | ◆◆ | | ◆ | ◆◆ | | ◆ | 31.0% | $29.77 | ~15 | $714,500 | $48,600 | $2.03 |
| Healthcare | Option A | | | ◆ | | | ◆ | | | | 1.5% | $1.23 | ~10 | $41,900 | $4,400 | $0.13 |
| | Option B | ◆ | ◆ | ◆ | | | ◆ | | | | 14.0% | $7.53 | ~13 | $256,100 | $19,900 | $0.59 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | ◆ | | 41.7% | $20.79 | ~13 | $707,000 | $53,800 | $1.58 |
| | Option D | ◆ | ◆ | ◆ | | | ◆ | | | ◆ | 22.1% | $19.39 | ~15 | $659,100 | $44,100 | $1.30 |
| Lodging | Option A | | | ◆ | | | ◆ | | | | 12.1% | $0.96 | ~8 | $28,700 | $3,700 | $0.12 |
| | Option B | ◆ | ◆ | ◆ | | | ◆ | | | | 16.1% | $5.69 | ~30 | $170,700 | $5,700 | $0.19 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | | ◆ | ◆◆ | ◆ | | 48.5% | $16.43 | ~23 | $492,900 | $21,600 | $0.72 |
| | Option D | ◆ | ◆ | ◆ | | | ◆ | | | ◆ | 29.0% | $12.41 | ~21 | $372,200 | $17,900 | $0.60 |
| Miscellaneous | Option A | | | ◆ | | | ◆ | | | | 7.1% | $0.61 | ~10 | $18,400 | $1,900 | $0.06 |
| | Option B | ◆ | ◆ | ◆ | | | ◆ | ◆ | | | 15.4% | $3.65 | ~27 | $109,500 | $4,000 | $0.13 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | | ◆ | ◆◆ | | | 29.4% | $12.50 | ~28 | $375,100 | $13,200 | $0.44 |
| | Option D | ◆ | ◆ | ◆ | | | ◆ | ◆ | | ◆ | 30.8% | $10.37 | ~19 | $311,000 | $16,100 | $0.54 |
| Refrigerated Warehouse | Option A | | | ◆ | | | ◆ | | | | 1.9% | $0.49 | ~12 | $16,800 | $1,400 | $0.04 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 10.2% | $11.01 | ~31 | $374,300 | $12,000 | $0.35 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 10.7% | $11.41 | ~32 | $388,000 | $12,300 | $0.36 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | ◆ | 26.3% | $22.86 | ~21 | $777,300 | $36,300 | $1.07 |
| Restaurant | Option A | | | ◆ | | | ◆ | | | | 0.8% | $0.60 | ~13 | $7,700 | $600 | $0.05 |
| | Option B | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | | | 20.9% | $12.23 | ~16 | $156,600 | $10,100 | $0.79 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | ◆ | | 37.4% | $15.97 | ~15 | $204,400 | $13,300 | $1.04 |
| | Option D | ◆ | ◆ | ◆ | ◆◆ | ◆ | ◆ | ◆ | | ◆ | 37.9% | $27.97 | ~16 | $358,000 | $22,200 | $1.73 |
| Retail | Option A | | | ◆ | | | ◆ | | | | 2.9% | $0.85 | ~15 | $16,900 | $1,100 | $0.06 |
| | Option B | | | ◆ | ◆◆ | | ◆ | | | | 25.9% | $9.10 | ~15 | $181,900 | $11,900 | $0.60 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | | ◆ | | | | 29.8% | $14.11 | ~21 | $282,100 | $13,200 | $0.66 |
| | Option D | | | ◆ | ◆◆ | | ◆ | | | ◆ | 53.9% | $23.35 | ~19 | $466,900 | $24,800 | $1.24 |
| Unrefrigerated Warehouse | Option A | | | ◆ | | | ◆ | | | | 0.8% | $0.25 | ~62 | $24,800 | $400 | $0.00 |
| | Option B | | | ◆ | ◆ | ◆ | ◆ | | | | 24.4% | $7.99 | ~39 | $799,500 | $20,400 | $0.20 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | | | | 35.2% | $10.08 | ~36 | $1,008,100 | $27,800 | $0.28 |
| | Option D | | | ◆ | ◆ | ◆ | ◆ | | | ◆ | 52.9% | $12.02 | ~27 | $1,202,500 | $44,700 | $0.45 |

## *Table C-6: Energy Conservation Measures for Existing Non-residential Buildings*

| NEW NON RESIDENTIAL | Energy Conservation Measure Package | Heating and Cooling | | | Lighting | | Hot Water Heating | | | Solar | Economic Results | | | Financial Results | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Heating Systems | Cooling Systems | VFDs | Lighting Systems | Lighting Controls | Install Low Flow Fixtures | Hot Water Boiler | Solar thermal hot water system | PV | % Energy Use Improvement | Capital Cost ($/sq ft) | Simple Payback (Years) | Initial Investment | Annual Savings | Annual Savings per sf |
| New Commercial (<30kSF) | Baseline | ◆ | ◆ | | ◆ | | | ◆ | | | 0.0% | $0.00 | - | $0 | - | - |
| | Option A | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | | 2.8% | $1.55 | ~22 | $30,900 | $1,400 | $0.07 |
| | Option B | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 12.6% | $4.10 | ~16 | $82,000 | $5,200 | $0.26 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | ◆ | | 13.6% | $4.24 | ~16 | $84,900 | $5,300 | $0.27 |
| | Option D | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | ◆ | 32.4% | $14.18 | ~16 | $283,500 | $17,300 | $0.87 |
| New Refrigerated Warehouse | Baseline | ◆ | ◆ | | ◆ | | | ◆ | | | 0.0% | $0.00 | - | $0 | - | - |
| | Option A | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | | 1.3% | $0.43 | ~13 | $14,600 | $1,100 | $0.03 |
| | Option B | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 3.7% | $1.83 | ~16 | $62,300 | $4,000 | $0.12 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | ◆ | | 4.3% | $1.94 | ~16 | $66,000 | $4,200 | $0.12 |
| | Option D | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | ◆ | 29.9% | $19.61 | ~17 | $666,800 | $40,300 | $1.19 |
| New Retail | Baseline | ◆ | ◆ | | ◆ | | | ◆ | | | 0.0% | $0.00 | - | $0 | - | - |
| | Option A | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | | 3.6% | $0.85 | ~15 | $16,900 | $1,100 | $0.06 |
| | Option B | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 13.0% | $2.44 | ~12 | $48,800 | $4,200 | $0.21 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | ◆ | | 14.0% | $2.52 | ~12 | $50,400 | $4,300 | $0.22 |
| | Option D | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | ◆ | 29.5% | $7.48 | ~15 | $149,500 | $10,300 | $0.52 |
| AVERAGE | Baseline | ◆ | ◆ | | ◆ | | | ◆ | | | | | | | | |
| | Option A | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | | 2.6% | $0.94 | ~11 | $23,200 | $2,133 | $0.09 |
| | Option B | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | | 9.8% | $2.79 | ~6 | $68,800 | $12,351 | $0.50 |
| | Option C | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | ◆ | | 10.6% | $2.90 | ~3 | $71,600 | $20,552 | $0.83 |
| | Option D | ◆◆ | ◆◆ | ◆ | ◆◆ | ◆ | ◆ | ◆◆ | | ◆ | 30.6% | $13.75 | ~9 | $339,300 | $37,618 | $1.53 |

# Appendix E: Public Outreach

## Public Outreach Strategy

The City has used several outreach strategies inform and involve the public in the development of the draft Climate Action Plan including the early formation of a Climate Protection Task Force of local stakeholders, two public meetings and specific web pages with agendas and minutes on the City's official website, an online survey, and a facebook page, as well as advertisements in local papers.

### Task Force

Union City Planning staff assembled a Climate Protection Task Force made up of community representatives in April 2009 to provide local insight for the CAP development and to help recommend a plan that prioritizes practices and programs to assist the community in achieving Union City's GHG emission reduction goal. The Task Force included representatives from the School District, Chamber of Commerce, Unified Sanitary District, UC Transit, Planning Commission, citizen representatives, as well as City staff from Planning, Public Works, and Recycling.

> The mission statement of the Task Force was *"to develop and recommend to the City Council a Climate Action Plan that prioritizes practices and programs that will further our Community's sustainability efforts and assist in reaching Union City's Greenhouse Gas Emissions Reduction Goal of 20% below 2005 levels by 2020."*

The Task force met a total of five times (between December 2009 and September 2010) with City planning staff and the CAP consultants to discuss potential measures and strategies for the CAP:

- Overview and introduction to Climate Action Planning
- Land Use and Transportation GHG Reduction Measures
- Buildings and Energy GHG Reduction Measures
- Waste, Water, and Green Infrastructure GHG Reduction Measures
- Proposed CAP Measures
- Public Review Draft CAP Review

At each meeting the Taskforce was provided with a briefing document on the sector and potential GHG reduction measures being discussed and were given the opportunity to provide a rating and written comments as well as verbal feedback. The Taskforce provided invaluable feedback for all action areas, by filling out detailed sheets and providing comments for suggested measures and actions. This input helped the consultants in making sure the CAP measures were applicable for the Union City context.

All presentations and materials were posted on the Climate Protection Task Force website (located as of September 2010, at www.union-city.ca.us/green_city/Climate%20Action.html).

## Public Meetings

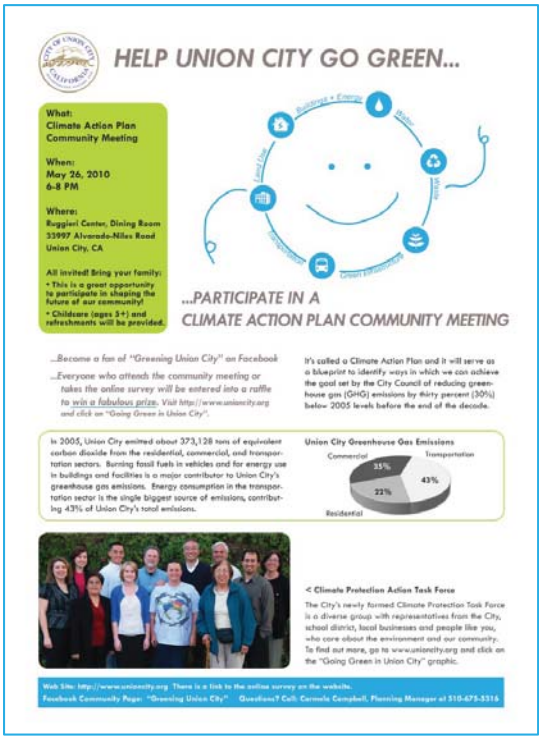
Two, 2-hour community meetings were held: one on May 26, 2010 at the Ruggieri Senior Center to comment on preliminary measures and generate ideas for new strategies, and a second public meeting was held on September 15, 2010 at the Holly Community Center to give the local community an opportunity to review and comment on the public review draft CAP.

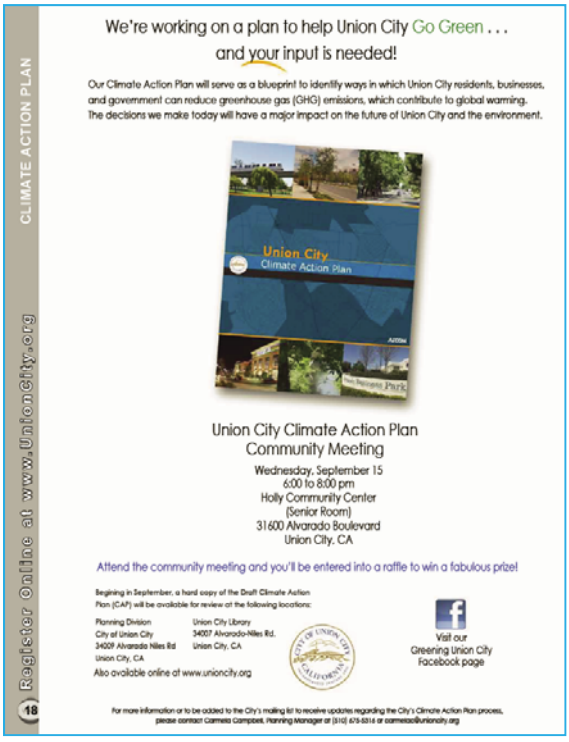
In these meetings, a total of nearly 50 people participated in break-out groups and provided detailed feedback on the GHG reduction measures presented. Participants were also asked to fill out the survey, either online or on paper. The presentations and meeting notes from the events were posted on the Climate Protection Task Force website.

Both meetings were publicized on posters around the community, with a full-page ad in the Activity Guide 2010, newspaper articles in the Tri-city Voice, on the front page of the city's website and noted on the "Greening Union City" Facebook page. City staff also sent out numerous e-mail blasts to citizen groups and posted information in community bulletins.

## *Public Outreach Materials*

The "Leisure Services Activity Guides" for summer and fall of 2010 featured a full page advertisement for the Climate Action Plan and the public meetings. The guide was mailed to all Union City households and was available on the city's website at the end of April (left) and again at the end of August (right).


HELP UNION CITY GO GREEN...
What:
Climate Action Plan
Community Meeting
When:
May 26, 2010
6-8 PM
Where:
Ruggieri Center, Dining Room
33997 Alvarado-Niles Road
Union City, CA
All invited! Bring your family:
• This is a great opportunity to participate in shaping the future of our community!
• Childcare (ages 3+) and refreshments will be provided.
...PARTICIPATE IN A
CLIMATE ACTION PLAN COMMUNITY MEETING
...Become a fan of "Greening Union City" on Facebook
...Everyone who attends the community meeting or takes the online survey will be entered into a raffle to win a fabulous prize. Visit http://www.unioncity.org and click on "Going Green in Union City".
It's called a Climate Action Plan and it will serve as a blueprint to identify ways in which we can achieve the goal set by the City Council of reducing greenhouse gas (GHG) emissions by thirty percent (30%) below 2005 levels before the end of the decade.
In 2005, Union City emitted about 373,128 tons of equivalent carbon dioxide from the residential, commercial, and transportation sectors. Burning fossil fuels in vehicles and for energy use in buildings and facilities is a major contributor to Union City's greenhouse gas emissions. Energy consumption in the transportation sector is the single biggest source of emissions, contributing 43% of Union City's total emissions.
Union City Greenhouse Gas Emissions
Commercial
Transportation
Residential
35%
43%
22%
< Climate Protection Action Task Force
The City's newly formed Climate Protection Task Force is a diverse group with representatives from the City, school district, local businesses and people like you, who care about the environment and our community. To find out more, go to www.unioncity.org and click on the "Going Green in Union City" graphic.
Web Site: http://www.unioncity.org There is a link to the online survey on the website.
Facebook Community Page: "Greening Union City" Questions? Call: Carmela Campbell, Planning Manager at 510-675-5316


CLIMATE ACTION PLAN
Register Online at www.UnionCity.org
18
We're working on a plan to help Union City Go Green . . .
and your input is needed!
Our Climate Action Plan will serve as a blueprint to identify ways in which Union City residents, businesses, and government can reduce greenhouse gas (GHG) emissions, which contribute to global warming. The decisions we make today will have a major impact on the future of Union City and the environment.
Union City
Climate Action Plan
Union City Climate Action Plan
Community Meeting
Wednesday, September 15
6:00 to 8:00 pm
Holly Community Center
(Senior Room)
31600 Alvarado Boulevard
Union City, CA
Attend the community meeting and you'll be entered into a raffle to win a fabulous prize!
Begining in September, a hard copy of the Draft Climate Action Plan (CAP) will be available for review at the following locations:
Planning Division
City of Union City
34009 Alvarado Niles Rd
Union City, CA
Union City Library
34007 Alvarado-Niles Rd.
Union City, CA
Also available online at www.unioncity.org
Visit our
Greening Union City
Facebook page
For more information or to be added to the City's mailing list to receive updates regarding the City's Climate Action Plan process, please contact Carmela Campbell, Planning Manager at (510) 675-5316 or carmelac@unioncity.org

## *City Website*

A portion of Union City's official website at http://www.ci.union-city.ca.us/ or http://www.unioncity.org/ is dedicated to "Greening Union City", which is easily accessed through the main home page. The CAP, minutes from the Taskforce meeting, and links to the survey and facebook page, were provided here.

UNION CITY
CALIFORNIA
Official City Website
Home
About Union City
City Services
Contact Us
Index
City Government
MAYOR AND CITY COUNCIL
AGENDAS AND MINUTES
MEETING VIDEOS ONLINE
COMMISSIONS/COMMITTEES
CITY ORGANIZATION CHART
CITY STAFF DIRECTORY
CITY MANAGER
CITY CLERK
CITY ATTORNEY
MUNICIPAL CODE
ELECTED OFFICIALS
ELECTIONS
DIRECTIONS TO CITY HALL
City Hall
ADMINISTRATIVE SERVICES
ECONOMIC & COMMUNITY DEVELOPMENT
FIRE SERVICES
LEISURE SERVICES
HUMAN RESOURCES
POLICE DEPARTMENT
PUBLIC WORKS
TRANSIT AND PARATRANSIT
Community
ABOUT UNION CITY
CHAMBER OF COMMERCE
CENTRO DE SERVICIOS
CLINICS & HOSPITALS
DIRECTORY OF SERVICES
EMERGENCY PREPARATION
GOVERNMENT OFFICES
HISTORICAL MUSEUM
HISTORY OF UNION CITY
LIBRARY
LOCAL MEDIA
SCHOOLS
PARKS IN UNION CITY
UTILITIES
Welcome to Union City
City News and Information
Got a minute? Take our online
Climate Action Plan Survey
click here
Annual National Night Out Set for August 3
The Union City Police Department invites you to celebrate National Night Out with your neighbors and community. It's scheduled for Tuesday, August 3 from 7 pm to 9 pm. National Night Out is designed to heighten crime awareness, generate support for local anti-crime programs, strengthen neighborhood spirit and secure a solid partnership between police and the community.
More on Nat'l Night Out in Union City
En Español
Money Camp for Ages 10 to 14
Union City Leisure Services is hosting a Money Ed Mini Camp. It is an exciting way for children to learn personal finance skills. Campers will play games and create projects that test their financial knowledge, while learning about MAKING, SPENDING and INVENSTING money. The camp is scheduled for August 16 thru 20 from 9 am to noon at the Union City Sports Center.
Learn more about Money Ed Mini Camp
Endless Summer Zumba Fitness Night
It's going to be a hot, sizzling summer for those who dance the night away at the Endless Summer Zumba Night on August 20th, from 8 pm to 10 pm at the Union
Union City
Crime
Reports
Get info here 24/7
Summer in the City
Click Here
City Meetings & Videos Online
click here
Union City Recycles

In the two weeks before the public meeting in May 2010, the City's main home page featured a prominent link with more information about the meeting. In addition, a link to the survey was featured during August 2010.

## *Online Survey*

In order to encourage more input and feedback from a broader cross section of the community an on-line survey specific to all areas of the climate action plan was available between May and September 2010 through the website and at the community meeting. The survey asked questions relating to transportation, access to services, energy use, water use, recycling and concern/interest about climate change. All survey participants that provided their contact information were automatically entered into a drawing for a prize, which was awarded at the second community meeting. The City received 32 surveys as of October, 2010.

## *Facebook Page*

In addition to the City's website, a community page "Greening Union City" was created on the social networking platform facebook for residents to be frequently updated and share information about the CAP. The page had 36 "fans" as of October, 2010.

# Appendix F: BAAQMD QUALIFICATION STANDARDS

## Bay Area Air Quality Management District

In 2005, the Bay Area Air Quality Management District (BAAQMD) adopted a resolution to initiate a Climate Protection Program, recognizing the link between climate protection and programs to reduce air pollution in the Bay Area. In 2009, climate protection was added to the Air District's mission, identifying its commitment to pursuing greenhouse gas reduction through all District programs and initiatives.

In June 2010, the BAAQMD produced updated CEQA guidelines which included for the first time thresholds of significance related to GHG emissions from plans and projects. BAAQMD has direct and indirect regulatory authority over sources of air pollution in the San Francisco Bay Area Air Basin (SFBAAB), of which a portion of Union City is a part. The approach to developing the thresholds was to identify levels for which a project would not be expected to conflict with AB32 legislation. If a project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact, and would be considered significant.

If a long-range plan includes goals, policies, performance standards, and implementation measures achieving greenhouse gas (GHG) emission reductions that can be shown to meet and/or exceed Assembly Bill (AB) 32 mandates, as outlined in Section 4.3 of the June 2010 BAAQMD CEQA Guidelines, subsequent projects consistent with the plan could be relieved of performing GHG analysis as part of their CEQA compliance (BAAQMD CEQA Guidelines, June 2010, Page 9-3). This approach is consistent with the State CEQA Guidelines, Section 15183.5.

The threshold for GHG emissions at a plan level is compliance with a qualified GHG reduction strategy or 6.6 MT CO2e/service population/yr. This CAP qualifies as a GHG reduction strategy as per the BAAQMD in terms of GHG quantification and measure development; achieving a 20 percent reduction in GHG emissions below 2005 levels by 2020 will reduce the GHG emission to service population ratio to approximately 2.5 (see calculation below).

**GHG Emissions to Service Population Ratio Calculation**

| Union City Projected Population in 2020 (source: ABAG) | Union City Projected Employees in 2020 (source: ABAG) | Projected Service Population in 2020 (source: calculated) | 2020 anticipated GHG emissions MT $CO_2e$/yr (assuming 20% reduction target) | Ratio MT $CO_2e$/yr to Service Population in 2020 |
|---|---|---|---|---|
| 85,200 | 24,860 | 110,060 | 273,838 | **2.5** |

The Union City Climate Action Plan (CAP) fulfills the following requirements of a BAAQMD-qualified GHG Reduction Strategy:

### 1. Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.

The Union City CAP includes an emissions inventory that quantifies an existing baseline level of emissions for 2005 and projected GHG emissions from a business-as-usual (BAU), no-plan, forecast scenario for 2020 (See Appendix A, GHG Inventory). The baseline year is based on the existing 2005 development pattern. Projected GHG emissions are based on anticipated growth through 2020.

Furthermore:

- The baseline inventory includes one complete calendar year of data for 2005. Carbon dioxide, $CO_2$, is inventoried for the residential, commercial, industrial, transportation, waste, and water sectors. Methane, $CH_4$, and nitrous oxide, $N_2O$, is also accounted for, where feasible.

- BAU emissions are projected in the absence of policies or actions that would reduce emissions.
- The BAU forecast projects emissions from the baseline year using growth factors specific to each of the different economic sectors (See Appendix A, GHG Inventory).

### 2. Establish a level, based on substantial evidence, below which the contribution of GHG emissions from activities covered by the plan would not be cumulatively considerable.

The Union City CAP proposes a reduction target of at least 20 percent below baseline (2005) emission levels by 2020. This target will be adopted by resolution, as a component of the CAP. The City's 20 percent below baseline levels reduction target is identified within BAAQMD's CEQA Guidelines as an appropriate threshold (BAAQMD 2010. California Environmental Quality Act Air Quality Guidelines, Page 4-10).

### 3. Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.

The Union City CAP identifies and analyzes GHG reductions from local and state policies and regulations that may be planned or adopted but not implemented to understand the amount of reductions needed to meet its target. Specifically, the CAP identifies and analyzes the effects of statewide GHG emission reductions related to implementation of AB 1493 fuel efficiency standards, the Low Carbon Fuel Standard (LCFS), and the Renewable Energy Portfolio Standard (RPS) (See Chapter 2, The Planning Process - Statewide Greenhouse Gas Reductions).

### 4. Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.

The Union City CAP includes mandatory and enforceable measures that affect new development projects, including water and energy efficiency ordinances related to the State's Green Building Standards.

The CAP includes quantification of expected GHG emission reductions from each measure where substantial evidence is available (See Chapter 3, GHG Reduction Measures), including disclosure of calculation methods and assumptions (See Appendix B. GHG Reductions). Quantification reflects annual GHG reductions and demonstrates how the GHG reduction target will be met.

Together, the proposed CAP measures provide for a reduction of 22.5 percent below 2005 baseline conditions. The anticipated reductions, in the context of planned future population and employment growth in Union City, would exceed the amount of reductions required to achieve the City's 20 percent below 2005 baseline conditions target, providing much needed flexibility in implementation.

### 5. Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specific levels.

Union City will monitor results that are achieved by the various CAP programs and policies. Monitoring results is a critical step in verifying that the measures and actions within the CAP are achieving the anticipated GHG emission reductions.

To ensure that new development projects are incorporating all applicable measures contained within the CAP, the CAP includes an implementation chapter (See Chapter 4, Implementation). The following BAAQMD requirements are addressed within the CAP:

- Identification of how each GHG reduction measure will apply to a sector, discerning between voluntary and mandatory measures (See Chapter 4, Implementation).
- Mechanism for reviewing and determining if all applicable mandatory measures are being adequately applied to new development projects (See Chapter 4, Implementation)
- Identification of implementation steps and parties responsible for ensuring implementation of each action (See Chapter 3, GHG Reduction Measures).
- Schedule of implementation identifying near-term and longer-term implementation steps (See Chapter 3, GHG Reduction Measures).
- Procedures for monitoring and updating the GHG inventory and reduction measures every 3-5 years before 2020 and submitting annual implementation updates to the Board of Supervisors (See Chapter 4, Implementation).
- Meetings every three to six months to report on the progress of implementation of individual measures, including assessment of how new development projects have been incorporating CAP measures (See Chapter 4, Implementation).

### 6. Adopt the GHG Reduction Strategy in a public process following environmental review.

The Union City CAP will be adopted following a public hearing process and preparation of an Initial Study and Negative Declaration pursuant to CEQA. Please refer to separate Initial Study / Negative Declaration document.

# Appendix G: PUBLIC COMMENTS

# Union City CAP Taskforce Meeting: September, 9 2010: Feedback on Public Review Draft of the Climate Action Plan

## *Land Use*

- Is expanding on what the city is already doing so little comment to add.
- LU-2: Creating neighborhood centers – good thing so people can walk to local services.
- Council asked for a balance for mandatory and voluntary and we hit it right
- Transit-Oriented Development (TOD): Good thing. City has already had the vision for the intermodal station so nothing new really here. Helping realize that vision.

## *Transportation*

- Walking and biking build out – why 25% only? (due to cost of infrastructure and the city budget)
- What is considered a 'safe routes to school' program?
- Who oversees the SRTS program? Mixture of school district and the City.
- Getting people onto their bikes is a good thing. Ref build out of masterplan – is it possible to put in barriers to separate bikes from cars? (as in Santa Cruz – low rubber barriers and San Francisco)
- Right to focus on the infrastructure and make the TDM programs voluntary.
- Clipper use for UC transit. Use it for AC transit and BART. To promote use for UC transit – ticket dispenser – free transfer at the BART etc. Consider this for the CAP. Note that UC transit is going to be part of Clipper system soon.
- Progress indicator – how to measure single occupancy car trips? From MTC and other data.
- What is average wait time for buses? This is something being looked at in the Short Term Transit plan. How many buses can they afford to run? Most are 30-60 minutes, although on some routes is higher.
- Clarification asked about the performance indicators for the bike masterplan build out. Good that the masterplan is focusing on the major thoroughfares.

## *Building and energy*

- Interesting that cool roof program was thrown in at the end
- How would we be promoting cool roofs? Through green building checklist, through outreach program? City gets lots of reroofs through ECD – so City will produce a handout to give to homeowners to encourage them to use cool roofs, and promote the rebates. City will look to target appropriate commercial buildings that would benefit from a cool roof, perhaps through working with the Chamber of Commerce. Also educate contractors about the benefits.
- Residential retrofits - for homeowners to reduce their bills. There will be a new Energy Upgrade California program which includes training of contractors, a particular list of measures that are recommended that are synced up with the rebates. This is to give people confidence to do the retrofits. Is also going to give cities the means to monitor participation in the program.
- Residential solar hot water – how did we come up the percentages? Due to the rebates available. And for PV: financing options include paying upfront capital cost using rebates or lease the system so no upfront capital costs. UC has seen an increase in application for solar. UC can track the PV roof installation in the City through the building department.
- Sunpipes in the roof to light the home so use less electric light
- Solar measures were very interesting.
- Smart Grid – it is a large offset? Would this be in place by 2020? Smart meters have already been installed in Union City.
- There has been criticism in press recently on Smart meters not performing as expected.

## *Waste Reduction*

- Likely to pursue a mandatory multi-family and commercial recycling ordinance in near future (6 months)? The state just passed a mandatory commercial recycling requirement but it won't be implemented for a year or so. Note that Allied Waste identifies multifamily as commercial.
- Schools are not mentioned in this section but schools should be a key area for working with the City to reduce their waste. 'Work closely with the school district to develop a comprehensive waste diversion plan'. School district just got a grant for recycling infrastructure.
- Construction and Demolition short term actions – 75% diversion? What does this mean? All materials.
- Some of the descriptions of the actions are a bit broad but it will allow us to be flexible to get enhancement of the new major programs already in place. There is room in the language to help us to get to the next level.
- The comprehensive waste and diversion plan development – this will include more specific actions.

## *Water*

- Looks good!
- Has water consumption gone up because more people are growing more vegetables? [generally water consumption on landscaping]
- Water washing the roads – maybe that could be stopped? As it isn't really cleaning the roads.
- Recycled water targets seem high. Need to add in rainwater to the performance indicator.

## *Green infrastructure*

- Program that if you had a live Christmas tree you could donate it to the parks system. Could that program be brought back?
- 3-57 - Another community garden on along Mission Boulevard and F street but it isn't city run.
- Seems reasonable to up the number of trees being planted to up it to 500 a year from 400.
- Bay Friendly Landscaping – is going to become a third party rating program – separate from StopWaste.Org. It is also a requirement of the Green Building permitting program.

## *Monitoring*

- How will the plan be monitored? There will be yearly monitoring in terms of what measures have been implemented.
- Implementation – who is going to do the monitoring? Need a plan, hire a coordinator. Need more concrete plan.
- Do we need a new inventory already for 2010 given that the last inventory was in 2005?
- Voluntary measures – how are we going to monitor those to see if they are having an impact?
- Do we need to ask local solar installers to let the City know if they have installed a system in Union City? Ditto PG&E on retrofit measures? Set up a system on UC website where people can report what they are doing?
- Note that the 20% target is more achievable – this is part of the reason why the City went for the 20% versus the 30% goal.
- The document sets priorities for the staff and Council – guide decision making on other plan documents.

## *Implementation section*

- Energy related program that is not referenced: Self generation incentive program from David Livingstone for 4-16. Grant program.

- Really need to get this plan communicated out into the community to make sure that this gets implemented.

### *Other notes*

- 3-68 – note that there is some weird font in first paragraph
- An executive summary would be useful for the community meeting.
- Mission statement of Green Task force should be made more prominent.
- Community meeting – can we have a final plenary session?

### *Feedback on Taskforce meeting process*

- Early process with the taskforce was a bit messy – in terms of understanding what measures are going to work in Union City at the beginning. Not sure how we could have made that progress a smoother one. (There is a big learning curve at the beginning?)
- Multi task process was good at helping us get to grips with the subjects.
- GHG 101 at the beginning might be useful – in terms of the calculations, what's in the inventory, what PV means etc.
- Was the rating sheet useful or not? Some of the rating sheets were overwhelming – there were so many parameters, hard to get head around it. Perhaps be a bit simpler. Other view was that the rating sheet was useful. Need to make sure the slides and the rating sheets sync up. Have the ppt online first.
- People on the task force have difficult levels of knowledge – who have helped each other understand. Very impressed with the City's knowledge.
- David – works in the City but doesn't live there so some of the mandatory measures were a bit odd to comment on as not going to be directly affected.

## Union City CAP Community Meeting: September, 15 2010: Feedback on Public Review Draft of the Climate Action Plan

### *Land Use and Transportation*

#### Group 1

Bike & Pedestrian

- The GHG analysis needs to account for the impact of cars idling while waiting for bike & ped crossings if improvements occur
- Emphasis should be placed on building Class I and other separated bike infrastructure
- Add rolling curbs
- Add more bicycle lockers throughout the City
- Emphasize bike routes on safest routes (i.e., Creek Trail)
- Lack of lighting is an impact on pedestrian and bike safety

TDM

- Dependent on market – when economy is stronger there is more employer interest in TDM programs
- Before the recession many businesses were looking into coordinating a BART shuttle for their employees

Transit

- Expand flexibility of bus routes
    - Used to be able to wave buses down

- Bring back the “FLEA”! (Origins of UC Transit)
- Subsidize local routes (i.e., shopping trips)
- Keep busier routes at full price

## Group 2

Bike & Pedestrian

- There is  no bicycle parking at Logan High School

Transit

- Coordinate UC Transit w/ NHSD so that students automatically pay $30 per month (cost of monthly bus pass), whether or not you use it. – Positive impact on traffic.
- Incentivize people taking transit to Union Landing – Century 25 gives discount to transit users on Friday nights.
- Need to publicize public transit through more outreach programs

Land Use

- Explain in the CAP that  the Hillside Area Plan helps focus growth in appropriate areas like the Intermodal Station District

## Group 3

- Teach residents to link shopping trips to reduce vehicle-miles-travelled (VMT)

Bike & Pedestrian

- City needs a bicycle shop  to facilitate cycling
- Emphasize Class 1 routes to promote the safety of bicyclists on major streets.
- Require alleys in new subdivisions

TDM

- Support reduced rate school buses to get students to and from schools – possibly partner w/ UC Transit to increase number of students on public transit

## *Buildings and Energy*

### Group 1

- Issues w/ MF housing allowing solar installation – barriers to solar
- Income qualified free energy efficiency upgrades – part of DOE and PG&E programs
- How to choose what policies to implement first . . .

### Group 2

- Do solar panels counteract cool roofs? Generate heat?
- Solar hot $H_2O$ can be effective, E-6.1 – This was emphasized in the CAP, and is a primary renewable energy strategy
- Emphasize cost-effective upgrades that are appropriate – that is the emphasis on the energy efficiency measures
- Show homes to demonstrate green measures in homes (in older parts of city)
- Contractor education/verification – perhaps supported by the Energy Upgrade California program
- Passive house: overhangs & deciduous trees to cool home
- Pro- voluntary for businesses – the CAP takes a pro-voluntary approach on energy measures – there are no mandatory measures, other than the existing Green Building Code
- Demonstration projects, local fairs /community events to provide info
- Signs could be solar powered – good promotional effort
- Outreach methods
    - Leisure – services guide – good avenue for publicizing elements of the CAP
    - Use police explorers to distribute info
    - Tri-City voice

### Group 3

- Solar on schools – good promotional effort, which could be negotiated with a solar company as part of a Community Challenge
- "Solar Cities" style program, E-7.3
- Voluntary measures put "burden" on consumers to make greener choices – What about financing districts?
- Reuse of construction materials – the C&D ordinance creates a greater supply of recyclable construction materials.
- Free PG&E home audits "whole house rebate"
- Outreach is important and not just on website.
- Dyer/Alu-Niles good place to advertise.

## *Water Conservation and Waste Reduction*

### Group 1

- Q: Are you considering people who compost at home?
- A: Hard to quantify. Don't know as we are only focusing on waste reduction numbers, don't know how many people compost privately.

- C: Helpful to have composting for harder to compost items.
- C: Communicate to City residents where composting material goes (farmers, if it is old and if yes, where-to?).

- Q: There is a waste reduction plan with a diversion target of 90%. Why is there no water reduction plan with a target?
- A: ACWD responsible. They have a plan, but good comment.
- C: The City should be more aggressive in their water conservation planning. Make it a goal.
    - Set a benchmark for water.

### Group 2

- C: Composting – I didn't know about it. Now I have a sense of accomplishment, for the 75% waste diversion we already achieved.
- C: We should sell what we are already doing well. We need to celebrate it.
- R: Let's get people involved.
    - to participate in waste diversion –
    - Need right information at the right place at the right time.

- R: Intent of Bucket for kitchen to help gather the food scraps and provide a receptor to bring them out to the large bin.
- C: Composting is saving food scraps from waste = This is a Good Message in our community, as many people perceive Americans as wasteful. We and our neighbors try to not create any waste by buying in bulk at Costco and by using everything up. Composting and learning about how the food scraps and organic matter is reused and not wasted, will help us with that.
- R: Single-stream recycling in UC since 2005. (metal + plastic + paper all together)
- We are worried about recycling thieves. We take our recycling to Tri-Ced personally.
- A: That is great. Taking recycling goods from people's private cans is illegal. An option is to put it out on the morning of the pick-up.
- Ban plastic bags. We are currently using them for food scraps!?
- A: Use paper bags, they compost and make it easier to collect food scraps without messiness.

- C: Water Conservation is important. We use the "wait-until-the-warm-water-comes"-water as water for our plants.

### Group 3

- Animals getting into Green waste.
- A: We increased the Green Waste pick-up to be weekly. Do the animals get into your regular trash too? It is good if you can secure the bins or have them in the garage.
- C: I compost on my property and don't have problems with animals. Never had any. But I don't compost meats. In that sense the composting program would help, as it allows composting of items that would take too long to break down in my yard [e.g. biodegradable utensils and food containers, meats, milk cartons].

- Q: Compostable Bio-bags – can Union City make them available at a low cost to make composting easier?

- Q: How much composting is happening?
- A: Don't know, only focusing on waste reduction numbers, don't know how many people compost privately.

- Q: Is graywater for watering my plants legal?
- A: Yes, Legal as of August 4, 2009 in CA. [The emergency graywater regulations, which added Chapter 16A "Non-potable Water Reuse Systems" into the 2007 California Plumbing Code, were approved by the California Building Standards Commission (CBSC) on July 30, 2009. The emergency regulations were subsequently filed with the Secretary of State on August 4, 2009, effective immediately upon filing. Chapter 16A establishes minimum requirements for the installation of graywater systems in occupancies regulated by the Department of Housing and Community Development (HCD). It is intended to provide guidance to code users while providing flexibility that will encourage the use of graywater (www.hcd.ca.gov/codes/shl/2007CPC_Graywater_Complete_2-2-10.pdf).]
- Look into permeable pavement & rainwater collection.
- A: included in CAP.
- Q: Have you been looking at green machines?
- A: Not in particular, but the CAP includes a "Low Impact Development" measures, which looks at managing stormwater with rain gardens, bio-swales, and bio-retention facilities. The CAP also includes a Water conservation policy to use recycled water (rain water and graywater) for indoor and outdoor systems.

## Emails on Public Review Draft CAP:

### *Email 1:*

Dear Carmela, the City Council and the Task Force,

Efforts to encourage an urban growth boundary, capitalizing on the use of our existing agricultural resources and implementation of smart growth concepts will reduce the City's Green House Gases (GHG) but these efforts are not specifically identified in the draft Climate Action Plan (CAP). For example, I was informed at two task force meetings held earlier this year about the benefits of having an urban growth boundary; however, this concept has not been included in the draft CAP to date. The urban growth boundary east of Mission Boulevard as initiated by the voter-approved Hillside Area Plan and as mentioned the City's consultant has reduced urban sprawl and GHG emissions tremendously.

The State of California, ABAG among other agencies has discouraged development on agricultural land, and the use of this resource should be included in the draft CAP. Use of this diminishing resource to provide locally grown produce for the Senior Center, Schools and the community would not only provide more availability to healthy food sources but would reduce our GHG reduction efforts at the same time. Freshly grown produce will reduce the transportation costs of shipping produce to our community.

Considering an urban growth boundary, agricultural land preservation and smart growth concepts, I suggest actions be considered by the City Council and Task Force for inclusion in the CAP:

> Action: Conduct a comprehensive urban growth boundary obstacle study to determine existing challenges, opportunities and priority investments in the City's infrastructure needs.
>
> Action: Encourage the use of the existing infrastructure including use of existing roads, utilities, storm drain and sidewalks, etc rather than expanding infrastructure.
>
> Action: Conduct a land use visioning process to identify goals for agricultural, recreational and open space uses in the Hillside Area that are consistent with the Hillside Area Plan policies.

Action: Conduct a smart growth visioning process with the businesses and the community to identify goals, key barriers and strategies to redevelop and revitalize the City.

Community engagement strategies to support the CAP:

Collaborate with Alameda County, New Haven School District, local agencies, leaders and educators to promote and support urban gardening and a farm to school program. Provide incentives for use of Union City's remaining agricultural resources to provide locally grown fresh produce.

I urge the City, City Council and the Task Force to consider adding these concepts to the Land Use, Transportation and Community Engagement Action Areas within the draft CAP. Thank you for your consideration in this matter.

Best Regards,

Elizabeth Ames,

Union City Resident

## *Email 2:*

To the extent that the plan is in response to global warming / cooling / dimming / disruption, the below article from the WOAI web site expresses my opinion well.

Let's not waste city funds in this endeavor.

Don Safer
Union City Ca.
==========

Texas Sues to Block Bizarre "Global Warming" EPA Rules lawsuit says science behind 'global warming' claims is junk, discredited

By Jim Forsyth

Thursday, September 16, 2010

The state of Texas today sued the U.S. Environmental Protection Agency in a federal appeals court in Washington DC, claiming four new regulations imposed by the EPA are based on the 'thoroughly discredited' findings of the Intergovernmental Panel on Climate Change and are 'factually flawed,' 1200 WOAI news reports.

Texas Attorney General Greg Abbott says the rules are illegal and if imposed, will cost Texans in higher energy costs and tens of thousands of lost jobs.

"The state explained that the IPCC, and therefore the EPA, relied on flawed science to conclude that greenhouse emissions endanger public health and welfare," Abbott said. "Because the Administration predicated its Endangerment Finding on the IPCC's questionable facts, the state is seeking to prevent the

EPA's new rules, and the economic harm that will result from these regulations, from being imposed on Texas employers, workers, and enforcement agencies."

The IPCC has become the target of criticism from other climate scientists, with numerous revelations of sloppy research, junk science, and allegations of cronyism, lack of transparency, and attempts to suppress contradictory opinions in the research which contributed to the IPCC's 2007 findings.

This page was intentionally left blank.